POSTER WEEK

Escola Superior de Tecnologia da Saúde
Politécnico de Coimbra

Poster Week 21/2024
Abstract Book

imagem: mercanographic

8th - 12th
April 2024

estesc
Politécnico de Coimbra

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Calendário

Poster Week 21/2024

	2ªf		3ªf		4ªf		5ªf		6ªf
	08/abr		09/abr		10/abr		11/abr		12/abr
8-9h									
9-10h			Fisiologia II IMR 1º 8P P. Matafome Aud. 3.3	MCNO II Audio 2º 6P Inês Araujo L.0.8					
10-11h					Gestão da Qualidade da Água II SA 2º 9P Cristina Santos S. 2.9				Investigação Aplicada em Farmácia Farm 4º 4P Rui Cruz S. Informática
11-12h	MTRA Audio 2º 5P Carla Matos Aud. 3.4	Neurofisiologia FC 1º 15P Joana Soares S. Zaida Chieira	Eletrocardiologia II FC 2º 7P Joaquim Pereira S. 2.9	Certificação de Qualidade Alimentar SA 3º 5P Cristina Santos Lab. Anatomia		Tecnologia Alimentar DN 3º 5P Jlima S. 2.4	Tecnologia Alimentar DN 3º 5P Jlima S. 2.4		
12-13h					Embriologia e Histologia Audio 1º 7P Célia Gomes Aud. 3.3				
13-14h						Farmacoterapia DN 2º 1P JJJ MB A Celia Gomes DN 2º 1P			
14-15h	Nutrição DN 1º 10P Bárbara Beleza S. 2.4		Anatomofisiologia II Farmácia + DN 1º 6 + 6P P. Matafome Aud. 3.3			Galénica II Farm 2º 10P Balteiro S. 2.8	Galénica I Farm.1º 10P Balteiro S.1.3	Saúde Pública SA 1º 9P Cristina Santos S. 3.12	
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LINKS TO POSTER FOLDERS

Folder	Disciplines	Year	Degree	Poster links
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21.2	Neurophysiology	1º	Clinical Physiology	https://photos.app.goo.gl/ZNW2uUdDKnJPWibr5
21.3	Human Nutrition	1º	Dietetics and Nutrition	https://photos.app.goo.gl/dP33xuNgSTffKpPz9
21.4	Physiology II	1º	Medical Imaging and Radiotherapy	https://photos.app.goo.gl/8xJTtdbYw7B5izKU9
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21.9	Anatomophysiology II	1º	Pharmacy	https://photos.app.goo.gl/GrhHgpYV2avRtMH2A
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21.17	Pharmacotherapy	2º	Dietetics and Nutrition	https://photos.app.goo.gl/qthtus6DSeLsYX2x9
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21.19	Galenic Technology and Pharmacy I	1º	Pharmacy	https://photos.app.goo.gl/nVBitQT396ayz4Z69
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INDEX ABSTRACTS

ABSTRACTS

ARTIFICIAL INTELLIGENCE APPLICATION IN CHILDREN'S AURAL REHABILITATION

Ana Pereira, Carolina Alves, João Melo, João Mendes, Mário Ferreira, Rodrigo Gameiro

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Introduction: Artificial Intelligence (AI) is a technological system developed with the intention of thinking and behaving like a human being, which makes them capable of processing information and acting rationally. This technology can be used as a tool in pediatric aural rehabilitation, simplifying diagnosis and rehabilitation process, facilitating monitoring of the child, their family and the audiologist.

Objective: Based on the literature review, we commit to associate the application of AI in audiology, focusing on aural rehabilitation of children and improve their quality of life.

Methodology: For the literature review we searched on the databases: Google Scholar, Web of Science and B-on. We requested the school library for additional research; they used MEDLINE, B-on and Web of Science. As for the inclusion criteria we considered articles published in the last 10 years, children that follow rehabilitation with AI devices. 20 articles were obtained and, after the inclusion criteria, 7 articles were considered for the study.

Results: AI tools like the Test for Evaluation of Auditory Function (TEAF), and Assistive Intelligent Hearing Aid System (AIHAS), are applications that have proven to aid in children's aural rehabilitation. TEAF relies on different modules (like word identification and sound detection) and can serve as a starting point to the rehabilitation process; AIHAS has an auditory assistive mode with multiple levels that teach children to pronounce words and sentences correctly.

Conclusion: The current development of AI-based systems used in audiology shows that its integration in pediatric aural rehabilitation it's likely to have a promising future.

Keywords: "Children"; "Artificial Intelligence"; "Aural Rehabilitation"; "Cochlear Implantation"; "Hearing Aid"

REHABILITATION IN MENIERE'S DISEASE

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Introduction - Ménière's disease (MD) is a progressive disorder of the inner ear characterized by symptoms such as sensorineural hearing loss, tinnitus, episodes of spontaneous vertigo and sensation of ear fullness. Although there are few elucidating mechanisms, the furthest information about its etiology was the discovery of endolymphatic hydrops (EH).
Objective - Describe and identify auditory rehabilitation methods in patients with Ménière's disease.
Methodology - We analyzed several articles related to the topic in the Web Of Science, PubMed databases and Master's Theses, selecting 13 and including only 10. In the inclusion criteria, we used articles that talk about rehabilitation methods and the pathology, while in the exclusion criteria we took into account articles published since 2014.
Results - There is nothing concrete about rehabilitation in Ménière's disease, however, auditory rehabilitation is performed using prostheses and, as a last resort, cochlear implant, Meniett´s device and vestibular rehabilitation to attenuate vertigo crises. To reduce the remaining symptoms, a low-sodium diet and lifestyle changes should be performed, diuretics, vasodilators, corticosteroids and intratympanic therapy should be used.
Conclusion - Improvement in prosthesis-free hearing after cochlear implantation in a patient with Ménière's disease is unexpected but possible and may provide insight into the poorly understood underlying mechanisms of sensorineural hearing loss in patients with Ménière's disease. Some treatments to control this disease allow a better quality of life providing independence and a higher self-esteem.

Keywords: Ménière´s disease; Rehabilitation Methods; Vertigo; Balance; Tinnitus.

SPEECH PERCEPTION IN NOISE IN ADULTS WITH COCHLEAR IMPLANT

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Introduction: Hearing loss affects individuals' daily lives. As a result, a new technology emerged, the cochlear implant. This aims to help people with their rehabilitation in case of severe to profound sensorineural loss. To be candidates for implantation, it is necessary to undergo audiological examinations. The biggest complaint in adult implant users, as a rule, is understanding speech in the presence of noise since the speech signals transmitted to the implant are significantly reduced compared to a normal hearing subjects.
Objective: To analyze the perception of speech in noise in adults with cochlear implants.
Methodology: A literature review was performed, using search strategies to identify studies evaluating. In this way, the electronic databases Pubmed, SciELO, Google Scholar, Web of Science, in English and Portuguese. 12 articles were obtained, one being excluded because it was prior to 2014, leaving only 11 articles remaining.
Result: Noise is where there are most complaints because it not only interferes at a peripheral level, but also at a central and cognitive level. In normal-hearing people, speech processing is done quickly and accurately, but in people with implants, long processing times and greater effort are required. Therefore, speech recognition rates are higher ipsilaterally than contralaterally. Electro vibrational stimulation supports speech perception.
Conclusion: In conclusion, competitive noise is harmful for some implant users, but for others it has its advantages, as it can improve their ability to understand. We came to realize that the perception of speech in noise depends on several factors such as age, duration of implant use, among others

Keywords: Cochlear implant; Adults; Speech perception; Noise

CENTRAL AUDITORY PROCESSING IN PEOPLE REHABILITATED WITH HEARING AIDS

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Introduction: Central auditory processing (CAP) is crucial for speech comprehension and auditory ability in general. As we know, the nervous system is responsible for translating the information sent by hearing, and so we conclude that it is not only about how we perceive sounds, but also about the way we hear them, since it can directly affect us in our daily lives, for example, in our attention, or even in the way we memorize or recognize a sound. In people rehabilitated with hearing aids, auditory training is essential, since this is a process of stimulation of the specific auditory skills that make up the central auditory processing (CAP), and its function is to improve the ability to understand speech in patients who use hearing aids who have difficulties, such as in noisy environments.

Objective: To investigate the efficacy of auditory training in individuals rehabilitated with hearing aids as a function of central auditory processing.

Methodology: A literature search was carried out through Google Scholar, Web of Science and SciELO through the following keywords: central auditory processing, hearing loss, auditory rehabilitation, hearing aids and auditory training. A total of 14 articles were used, and 7 published from 2013 onwards were excluded.

Results: It was found that there were significant improvements in CAP when comparing the participants' reports before and after undergoing auditory training. There was also an improvement in central auditory processing skills, such as sound localization, selective attention, memory, temporal resolution and binaural integration.

Conclusion: Highlights the importance of auditory training as a complement to rehabilitation in people with hearing loss to improve CAP. That said, the results suggest that there is a positive change, in addition to being beneficial in the use of hearing aids, in order to improve quality of life and hearing outcomes.

Keywords: Central Auditory Processing; Hearing Loss; Auditory Rehabilitation; Hearing Aids; Auditory Training

THE EVOLUTION OF HEARING AIDS

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Introduction- The hearing aid is a medical device used in auditory rehabilitation programs aimed at improving the quality of life of its user. Hearing loss contributes to social isolation with an impact on family relationships. Throughout history, there has been a need to create increasingly sophisticated algorithms to address the challenges posed by hearing loss.
Objective- Addressing the evolution of hearing aids, from their inception to the transformations they underwent to reach the technology of current hearing aids.
Methodology- Review and consultation of scientific articles and websites related to the topic, specifically websites of audiology centers, searched on Web of Science and Google Scholar, using as main search engines the keywords "hearing aids," "evolution," and "hearing" in both Portuguese and English.
Results- The Frenchman Jean Leurechon was the first driving force behind this evolution, creating the first device, known as the ear trumpet. With technological advancements, the following devices were developed: Akouphone; Vactuphone; transistor hearing aids leading up to the latest types of devices using microprocessor technology, compression systems, high-speed processors, and microcomputers. In the 2000s, the first fully digital hearing aids emerged, incorporating high technology for signal processing.
Conclusion- With technological advancements, hearing aids have undergone essential transformations for their users, promoting a better quality of life. Since technology is constantly evolving, the creation of new technologies applied to hearing aids can be expected.

Keywords: Hearing aids, evolution, technology, hearing loss

THE BRAIN OF A SERIAL KILLER

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The brain of a serial killer has several neurophysiological changes compared to a brain of a normal individual. It is important to note that there is no uniform pattern established, but it is possible to enumerate the main changes that can be associated with an antisocial and psychopathic personality, such as dysfunction in the serotonin system, a low connection between the amygdala and the prefrontal cortex, and changes in testosterone and cortisol levels.

With this review, we aim to better understand some of the neuroanatomical and neurophysiological changes in these individuals.

Some studies have shown a dysfunction in the serotonin system (5-HT, receptor to which serotonin binds) that occurs in individuals with aggressive and impulsive behavior. In addition, low serotonin levels are associated with depression, because there is bi-directional communication between 5-HT and the circadian system.

Further research reveals that the connection of the prefrontal cortex and the amygdala is another of the main altered factors, given that specific studies in which aggression was examined showed that the coupling between the amygdala and the medial orbitofrontal cortex was absent in patients with intermittent explosive disorder.

Cortisol and testosterone influence various factors such as aggression, psychopathy and also relate to the amygdala and prefrontal cortex through the modulation of fear. This relationship is complex and varies according to age, gender, and degree of psychopathy and aggressiveness.

However, more research is needed to identify other relationships between the behavior of these individuals and neurophysiology.

Keywords: Amygdala, Serotonin, Prefrontal cortex, Cortisol

GENES, BRAIN AND AUTISM: HOW ARE THEY RELATED?

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Autism spectrum disorder (ASD) is characterized by impaired social interaction and communication, associated with stereotyped behaviors. In the last decades more than 1,500 genes associated with conditions such as intellectual disability and autism were identified.
A correlation between the distribution of autism-related genes' and imprinted genes' has benn described. Through the analysis of the normal brain microarray data, a spatio-temporal coordinate system of gene expression during human brain development was constructed, showing 13 differentially expressed genes during brain development, both autism-related genes and imprinted genes. Enrichment analysis illustrated that these genes are mainly involved in gamma-aminobutyric acid signaling pathway, neuron recognition, learning, memory, and regulation of synaptic transmission. Bioinformatic analysis implied that mutation or epigenetic changes in imprinted genes could play an important role in the diagnosis and prognosis of autism.
The traditional view on the cerebellum is that it controls motor behavior. Recent work has revealed that the cerebellum also supports nonmotor functions, such as cognition and affect, and plays an important social role. Cerebellar circuitry appears as a key structure to elucidate social interactions, showing a correlation with clinical impairments such as ASD. Therefore, the cerebellum might be a potential target for noninvasive brain stimulation.
These two studies systematically correlates brain development and genomic imprinting with autism, selecting potential candidate biomarkers for early diagnosis and showing the possible role of the cerebellum as a therapeutic target.

Keywords: Genes, Autism, Brain, Cerebellum

Discipline: Neurophysiology

Professor: Joana Isabel Soares

Degree: Clinical Physiology

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NEUROPHYSIOLOGY OF LANGUAGE

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The organisation of language is based on a "classic model" proposed in the 19th century and other recent models that are not widely accepted. This literature review seeks to understand the neuroanatomical models of functional language and the different types of aphasia. A PubMed search was carried out using the keywords "neurophysiology"; "language"; "Broca's area"; "Wernicke's area"; "arcuate fasciculus"; and "aphasia". We found 16 articles and 8 were included. In the classic model, the language area is located in the dominant hemisphere and mainly involves cortical regions of the brain such as Broca's area, Wernicke's area, arcuate fasciculus, and angular gyrus. Broca's area is located in the inferior frontal lobe and is the centre for the motor execution of speech and sentence formation. Aphasia, which is an impairment of language, caused by lesions in those areas of the brain, is most commonly observed in patients who have suffered a stroke, but can be observed in neurodegenerative diseases. There are seven types of aphasia: receptive, expressive, conductive, transcortical sensory, transcortical motor, mixed and anomia. Recent models advocate processing in the "dorsal" and "ventral" pathways, mediating phonological and semantic processing, respectively. Phonological processing goes from the posterosuperior temporal cortex, while semantic information goes from the temporal lobe to the basal occipitotemporal cortex, with anterior connections.

By tracing historical advances, the classical model helps us to better understand the anatomy and functional organisation of language. Recent models provide additional support to refine and amplify this model.

Keywords: Neurophysiology, Language, Broca's area, Wernicke's area, Arcuate fasciculus

WHAT DO MIRROR NEURONS REALLY DO?

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The mirror neuron system is the neural basis of our ability to understand the actions of others, through motor mapping of the observed action on the observer's motor repertory.
The essential characteristic of these neurons is to combine the processing of sensory information, especially visual, with that of motor information. Their elementary function would be to provide a motor simulation of the observed action based on visual information from it, in activities such as interacting with environment, grasping objects, empathy and compassion for others, emulation and emotion contagion, observing and imitating, learning sports, motor skills and dance, motor rule understanding, understating the intentions of other, gestures and body language, lip reading, recognizing actions by their sounds and learning to play musical instruments.
Brain areas where these neurons are localized - such as the inferior parietal lobule, including the lateral and ventral intraparietal areas, and in the dorsal premotor and primary motor cortex, and also in areas where language is formed - contribute to low-level processing of observed action. Especially focusing on speech and language, scientists observed that in these areas, although unclear whether of not mirror neurons play a very specific role in speech perception, there is compelling evidence for the involvement of these neurons in the discrimination of speech, and furthermore in copying sounds and lip reading in order to form words and sounds in speech when called upon due to their abilities such as, like the name says, mirroring actions.

Keywords: Mirror neurons, Language and speech, Empathy

THE EFFECTS OF CAFFEINE IN CEREBRAL CIRCUITS

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Caffeine is a widely consumed substance globally, especially among adults and young adults, notably college students, found naturally in coffee, tea and cocoa. The rise in caffeine consumption is driven by aggressive marketing and easy availability, despite limited awareness of its potential harms. Recommended caffeine intake is under 200-300 mg daily, yet college students often exceed this, averaging over 800 mg per day (twice the safe limit). Recent findings on caffeine's effects on mood, attention, processing speed, and memory yield mixed results. While caffeine can improve concentration, energy and reduce fatigue, it also affects appetite, mood, sleep, and anxiety levels. Furthermore, caffeine intake negatively impacts academic performance, contrary to students' beliefs.

Caffeine is a CNS stimulant. Research indicates widespread use among university students, with varying perceptions of its impact on mental and physical health, which may potentially influence intake, leading to addiction and public health concerns. Studies on both humans and animals have shown how caffeine affects cognitive function. Also, it alters CNS function by blocking adenosine receptors, affecting other bodily systems. It may also disrupt melatonin secretion, dysregulating the sleep-wake cycle, which could lead to sleep disturbances due to changes in the typical circadian rhythm.

In conclusion, caffeine's influence extends to multiple physiological systems, such as cardiorespiratory, endocrine, and notably, neurological functions, which commonly affect sleep patterns, behaviours, and heart rate. The overconsumption of caffeine has been linked to detrimental effects, emphasizing the importance of being cognizant of its neurological impact.

Keywords: Caffeine, Sleep, Students, Adenosine

HOW THE BRAIN REACTS TO MUSIC

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Over the years, music has become a method widely used in neuromedicine for aiding the treatment of several pathologies, as it has effects on the autonomic nervous system. Through music, patients improve their quality of life, reduce anxiety levels, and control their mood.

Music therapy can be used for serious mental disorders, such as schizophrenia, as it helps in improving emotional skills, relationships with other people and approaching certain life problems in a different way. These patients have a profound difficulty managing their emotions and thoughts, making interaction with other people very difficult.

Music generates powerful stimuli by transmitting visual, auditory and motor sensations, that are processed in a specific neuronal network located between the fronto-temporoparietal regions. Specifically, music stimulates the neuroreceptors of the excitatory circuits and auditory circuits, enabling the interaction of hair cells with the neurons of the ascending auditory pathway. This stimulation helps the development of areas of the auditory cortex, motor cortex, prefrontal lobe and the amygdala, which are part of the limbic system, the system responsible for emotions, behavior, memories and social responses. These regions are connected through essencial neural circuits implied in emotion processing and social cognition, controlled by the different structures of the limbic system.

Keywords: Music, Neuromodulation, Cognition

NEUROFEEDBACK: CAN WE TRAIN THE BRAIN?

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Neurofeedback is a technique with direct feedback of neural activity to the participant. It is used mainly with a therapeutical purpose but can also improve cognition, enhancing attention and concentration. The patients learn how to control their own brain electric activity, through many representations. The continuous repetition of this interactive procedures, can develop the capacity of self-control, leading to a painless treatment, that is appealing to the patient.

For our review, we decided to use some recent PubMed articles. These articles include various experiences and studies led by experts on the field, thus providing a reliable source for the conclusions presented in our work.

Some authors demonstrated that in a six-week training program, EEG frequencies were modified for different tasks. Also, it has been shown that neurofeedback induces neuroplasticity, changing cortical excitability. Particularly, there are changes in grey matter volume and white matter connectivity after a consistent number of sessions. The neurofeedback training has been used in the treatment of many brain disorders and can be the solution to regulate the desired frequency bands, with the objective of upgrading the performance of an individual. However, a wide spectrum of protocols can lead to inconsistent results, since several parameters, such as session duration and frequency, can lead to different outcomes. More studies are needed to obtain reliable results and to ensure clinical benefit of this method in different pathologies.

Keywords: Neurofeedback, EEG frequencies, Neural activity

HOW DOES THE BRAIN RESPOND TO PAIN?

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The primary sensory cortex is mostly responsible for pain. Processing pain is a very complex mechanism that results from the interaction of neuroanatomical and neurochemical phenomena, presenting both cognitive and affective components.

In a neuroanatomical approach, pain is the interpretation, in the central nervous system, of nociception, a process by which information about tissue damage is transmitted to the brain.

The sensation of pain leads to suffering through cognitive, emotional and autonomic processing, and is expressed as anger, fear, frustration, anxiety and depression. The areas associated with processing mental pain, in the case of depression, include the thalamus, insula and anterior cingulate cortex.

Chronic pain can be expressed in countless ways, with phantom limb pain being an example of this. The amputation of a limb increases the development of serious neurological problems as a response to numerous stimuli. The sensation of pain in the lower extremity of the amputated limb is transported from a peripheral receptor to the dorsal root ganglion cells, which are more sensitive to chemical and mechanical changes. High levels of glutamate and NMDA (N-methyl d-aspartate) have been described as a possible molecular mechanism. Also, these changes can be related with hyperalgesia and allodynia suggesting a maladaptive plasticity common in these patients.

In conclusion, there are neuroanatomical and neurophysiological processes by which the brain processes pain. These cause greater sensitivity and consequently greater awareness of pain.

Keywords: Phantom limb, Chronic pain, Glutamate

THE NEUROSCIENCE BEHIND MEDITATION

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Mindfulness meditation is a practice that involves the cultivation of present moment awareness, in a non-judgmental and accepting way, by altering neural processing and emotion regulation.
This review summarizes the benefits of mindfulness meditation for psychopathologies characterized by emotional dysregulation, such as depression and anxiety, by examining brain activity, specifically the amygdala activation and its connectivity with the ventromedial prefrontal cortex (VMPFC).
Research indicates that engaging in long-term meditation (LTM) may decrease the amygdala's response to negative stimuli compared to short-term meditation (STM). This suggests an improvement in emotional regulation and cognitive function. Moreover, mindfulness meditation can enhance the connectivity between the amygdala-VMPFC, leading to better emotional regulation, decision-making, and social behavior. Additionally, long-term meditation (LMT) has been found to reduce sensitivity to pain.
Thus, reducing the amygdala activity by meditating can be beneficial for certain psychopathologies, although it's not the sole factor involved in effective treatment.

Keywords: Mindfulness, Meditation, Psychopathologies, Amygdala

HOW CAN CHILDHOOD TRAUMA AFFECT THE BRAIN?

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Childhood trauma is a major public health problem that affects mental health and personality development, triggering neurobiological events. Childhood abuse can dysregulate the neurobiological system, reducing resistance to stressful events and causing problems with emotional regulation. These traumas are associated with stress-related mental disorders that persist into adulthood.

Firstly, a child who is normally subjected to physical or emotional abuse tends to have difficulties on the brain's functionality which can affect, for example, the function and structure of the prefrontal cortex. Besides having an increased risk of depression, children who relate to events which caused childhood emotional trauma tend to have more difficulty to cope with their emotions as well as expressing their feelings. It has been shown that, during the telling of a traumatic event, can be identified the activation of the limbic system, associated with processing emotions and behaviors. Particularly, the amygdala, part of the limbic system that assigns emotions to our memories and of the sympathetic nervous system which can lead to anger and aggressive behaviors as a young child or in the adolescence. Some authors showed that children who suffer from post-traumatic stress disorder have a decrease in the volume of the hippocampus and the amygdala. These negative surroundings can lead to low self-esteem.

In conclusion, a large portion of children subjected to a traumatic event undergo alterations in brain structures, which may hinder their development as human beings. These same children are also prone to developing disorders associated with difficulty in forming a personality.

Keywords: Brain, Childhood trauma, PTSD

BRAIN TUMORS IN CHILDREN

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Diagnosing a malignant tumor implies the assessment of parameters such as histology, shape, size, volume, location and neurological signs that define severity. Children's brain tumors differ from those in adults, despite the similar nomenclature, with the added complexity due to a developing brain. Pediatric brain tumors of the central nervous system are the most common in children and represent the largest cause of childhood cancer-related mortality.

This review explores the brain tumors in children, more specifically the medulloblastoma.

Medulloblastomas are the most common type of brain tumor in children and usually appear as a solid mass in the cerebellum. They are all classified as grade 4 tumors, this means they are malignant and fast-growing.

In magnetic resonance imaging this tumor shows a high contrast uptake. It can block the cerebrospinal pathways, causing an abnormal build-up of fluid, which increases intracranial pressure. First line treatment for medulloblastoma is surgery, removing as much tissue as possible without causing more symptoms for the patient, and allowing histological characterization. Adjuvant treatments are frequently needed, which may include radiation therapy or chemotherapy, to increase local and distant control.

Technological improvements, such as the inclusion of molecular classification in the diagnosis of medulloblastomas, allowed for a better risk stratification and clinical management.

Keywords: Pediatric tumors, Medulloblastomas, Treatment

IMPOSTOR SYDROME: FRIEND OR FOE? A NEUROPHYSIOLOGICAL APPROACH

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The imposter syndrome refers to the notion that some individuals feel as if they ended up in esteemed roles and positions not because of their competencies, but because of some oversight or stroke of luck. Such individuals therefore feel like frauds or “impostors". Our goal was to review the main clinical aspects of Impostor Syndrome and to do so, a search on Pubmed was carried out. Potential underlying causes for this phenomenon are both anxiety and depression, associated with changes in the stress-related system, which may lead to chronic brain neuromediator imbalances. Stress is usually associated with activation of the brainstem locus coeruleus/norepinephrine system, which subserves arousal and regulates the functions of the autonomic nervous system, and the hypothalamic-pituitary-adrenal axis which play modulatory roles. Although stress is essential for keeping us alert, the chronic activation of the stress system may be associated with dysphoria, anxiety, depressive symptoms, and somatization phenomena, that are common in imposter syndrome.

Other biological systems, such as the hypothalamic-pituitary-gonadal axis and the associated sex hormones, could be involved in the pathogenesis of the imposter syndrome as well, partially explaining the increased prevalence of the syndrome in women. Intermittently secreted mediators, such as serotonin, oxytocin, and dopamine, participate in achieving constitutional happiness and optimism. On the other hand, continuous or very frequent activation of the stress system could lead to desensitization of the reward system and constitutional unhappiness and pessimism about the future.

Keywords: Impostor Sydrome, Performance, Hypothalamic-pituitary-adrenal axis

EFFECTS OF CANNABIS ON THE HUMAN BRAIN

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Recent research has been focused on cannabis and its effects in the treatment of symptoms of various diseases. Cannabinoids have an influence on the release of dopamine, norepinephrine, acetylcholine, and inhibit release of GABA and glutamate, due to their biological action on the endocanabinoid system. Consequently, it will have effects on memory, attention, sense of reward, pain, appetite stimulation and muscle spasticity. It is inferred that cannabidiol may play an important role in the symptoms of neurodegenerative diseases, but most studies are inconclusive. Besides medical use, different compounds are used for recreational consumption, such as THC, CBD (cannabidiol).

Although there are many positive aspects regarding the effect of cannabis, it shows several side effects that affect several systems. Considering the neurological system, dizziness, drowsiness and seizures may occur; for the cardiovascular system people may experience tachycardia and hypertension. Inadequate use of this compound can also induce infertility, dependence, tolerance and affect short-term memory. To prove the side effects, neuroimaging studies have been conducted and showed a reduction in the density and the volume of the hippocampus.

In general, the medicinal use of cannabis has benefits in aiding the treatment of certain diseases. Recreational consumption shows more disadvantages, since it is not done in a controlled way, but it is increasingly common.

Keywords: Cannabis, Medical use, Consumption, GABA

WHAT TRIGGERS THE SCHIZOPHRENIC BRAIN?

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Schizophrenia is a chronic illness that presents with both positive and negative symptoms affecting cognition and emotions. It is a highly prevalent psychiatric disease and at least two symptoms are required for the diagnosis, one of which must be a positive symptom. There are several theories on the dysregulaton of main neurotransmitters as the cause for clinical manisfestations. Subcortical dopamine dysfunction seems to be a key factor.

Dopamine regulates a range of motor, limbic and cognitive functions. Based on evidence from a number lof disorders, dysfunction of the dopamine system is thought to contribute to a range of neuropsychiatric symptoms. Early perturbations in the dopaminergic system were hypothesized to be a causative factor in the development of the disorder, driving both psychotic and cognitive symptoms.

The primary circuit responsible for psychotic symptoms forms between the thalamus, cerebral cortex, and associative striatum, where changes in any of these regions can impair the whole network.

Studies have shown that dopamine neurons not only release dopamine in a synaptic signal mode but also release co-transmitters glutamate and gamma-aminobutyric acid (GABA). The N-methyl-D-aspartate (NMDA) receptor antagonists such as ketamine and phencyclidine can disrupt the thalamus circuit and lead to cognitive dysfunction and psychotic symptoms.

Although schizophrenia is a complex syndrome that is difficult to manage, investigating the neurobiological processes behind behavioral disorders will facilitate a better understanding of the pathogenesis and targeted therapy.

Keywords: Schizophrenia, Dopamina, Co-transmitters, NMDA receptor.

HOW WE DREAM?

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Dreams are complex mental experiences that occur during sleep, and involve perceptions, thoughts, and emotions. These are mainly linked to REM sleep, which is characterized by a high-frequency EEG but can also appear during NREM sleep.
For a better understanding of how we build our dreams and how they manifest themselves during sleep, we searched PubMed.
The development of dreams is associated with specific anatomical areas, mainly with the cerebral cortex, the brainstem and the limbic system, which includes structures such as the hippocampus and some cholinergic and aminergic nuclei. This can be explained by theories, such as Freud's psychoanalysis or by neuroscientific models that suggest that dreams are reflections of unconscious functioning, resulting from the synthesis of internal information or controlled by specific processes in the brain. Several studies have identified a cortical brain region crucial for dreaming, the so-called "hot zone". It has distinct patterns of activity during NREM and REM sleep. In these stages, a reduced activity of the hot zone is related to reports of dream experiences upon awakening. On the other hand, when this zone has a higher activity, it is associated with the absence of dream experiences. The duration of dreams during NREM sleep is generally shorter than dreams during REM sleep, therefore the variations in EEG tracing.
Thus, although sleep stages have distinct patterns of brain activity, they are equally susceptible to dream creation. This relationship suggests that the hot zone plays a key role in the experience of dreaming during sleep.

Keywords: Dreams, "Hot Zone", Brain activity, Sleep

SELENIUM: BENEFITS, SOURCES AND POTENTIAL RISKS

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Introduction: Selenium, an essential trace element, is crucial for bodily functions. It is a key component of enzymes and proteins known as selenoproteins, aiding in DNA synthesis, cell protection, and immune function. These proteins also play roles in reproduction and thyroid hormone metabolism.

Objectives: This work aims to explore the sources, benefits and potential risks associated with selenium consumption.

Methodology: The scientific research for this work was based on the websites PubMed, Harvard T.H. Chan School of Public Health - Harvard University and Google academic databases, using the keywords “Selenium”, “Risks”, “sources”, “benefits” and “deficiency”.

Results: Selenium intake from plant foods varies based on soil selenium levels. It can also be obtained from seafood, meats, dairy, and grains. While selenium is vital for health, excessive consumption can cause adverse effects like diarrhea, neurological issues, metallic taste in the mouth and loss of hair or nails. Severe toxicity may lead to kidney failure and cardiovascular complications. On the other hand, selenium deficiency can cause conditions such as Keshan disease and male infertility, with symptoms including nausea, headaches, and seizures. Groups at risk for deficiency include those in low-selenium regions with plant-based diets, individuals with HIV, and people with kidney failure undergoing dialysis due to reduced intake and absorption.

Conclusion: A balanced selenium intake is vital for optimal health, as both deficiency and excess can lead to significant issues. Understanding its sources, effects, and absorption factors is crucial for managing intake effectively and preventing related disorders.

Keywords: Selenium, Benefits, Sources, Potential Risks

IRON STATUS OF VEGETARIANS

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Introduction: Iron plays a crucial role in the human body, being necessary for the production of hemoglobin, which transports oxygen to all cells. This paper seeks to explain the importance of iron in human health, namely the levels of this nutrient in vegetarian people, and the impacts of its deficiency, as a deficiency of this mineral can lead to conditions such as anemia, which is characterized by fatigue, weakness and lack of concentration. Iron-rich foods include red meat, poultry, fish, dark green vegetables, legumes, dried fruit and fortified cereals.

Objective: Analyze iron intake in vegetarian individuals and possible nutritional deficits.

Methods: Research on https://pubmed.ncbi.nlm.nih.gov using the search terms “Iron”, “Vegetarian” and “Nutrition”. Three articles were chosen.

Results: Individuals with a plant-based diet have a higher risk of iron deficiency due to having a lower concentration of ferritin in the body and therefore a greater difficulty in storing iron from food. A higher iron intake is recommended for vegetarians - around 1.8% more than omnivores.

Conclusion: Vegetarians may often have lower ferritin levels, even when their iron intake is within parameters. They should, therefore, choose to consume green vegetables, legumes, foods with whole grains and foods rich in vitamin C and organic acids, in order to facilitate the absorption of iron.

Keywords: Iron, Vegetarian, Ferritin, Nutrition

Discipline: Human Nutrition

Professor: Bárbara Beleza

Degree: Dietetics and Nutrition

A 23

Edition 21/2024

ZINC: REQUIREMENTS, SOURCES, RISKS AND BENEFITS OF SUPPLEMENTATION

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Introduction: Zinc is a fundamental mineral for our health, since it appears in several enzymes helping in the structure of proteins. Zinc helps in the maintenance of brain functions and the immune system and works as an antioxidant.

Objectives: Explore zinc requirements, sources, risks and benefits of supplementation.

Methodology: Our research was based on the National Institutes of Health (NIH) and Pubmed.

Results: Despite being abundant in the human body, zinc cannot be stored in large amounts. Daily requirements range from 2-13 mg, depending on age, gender, and life stage. While a balanced diet usually provides sufficient zinc, older individuals, those with bowel issues, and pregnant or breastfeeding women may require additional intake. The richest zinc sources are animal-based such as seafood and meat. Vegans and vegetarians need plant-based sources suitable for their diets, like beans and seeds, but zinc absorption is lower. Other sources are supplements and medications. Zinc supplementation, while beneficial for health, carries risks of deficiency and excess, affecting skin, bones, and immunity. It's crucial for vegetarians, pregnant individuals, and those with gastrointestinal issues to manage intake carefully to avoid infant diarrhea, stunting, and compromised immunity, ensuring a balance between adequate nutrition and toxicity prevention. Supplementation can support colds, control acne, prevent diseases as it is an antioxidant, and it is used to control type 2 diabetes.

Conclusion: Zinc is essential to health although its requirements depend on each individual. It is present in several foods and supplements and its excessiveness or scarcity can cause health problems.

Keywords: zinc, zinc requirements, zinc sources, risks of deficiency and toxicity

CALCIUM, VITAMIN D AND BONE MINERAL DENSITY

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Introduction: Calcium and vitamin D are important for bone health and disease prevention. Calcium can be obtained from food sources, particularly dairy products, and vitamin D from dairy products and offal, and can also be obtained from sun exposure.

Objectives: The aim of this study is to find out how vitamin D and calcium influence bone mineral density and to assess whether there is any benefit in consuming the two in combination.

Methods: At the beginning of the investigation, the search engine "Google" was used to conduct a general search and thus have a complete perception of the information. Then, to confirm if the data obtained were valid, we use "Pubmed" and selected 4 articles for the study.

Results: Research has revealed that the parathyroid glands are responsible for controlling calcium levels in our bodies through the secretion of parathormone (PTH) - PTH interacts with vitamin D, leading to the intestinal absorption of more calcium from food.

Discussion/Conclusion: Vitamin D is essential for the proper absorption of calcium in our body, which is why it is very important to consume vitamin D and calcium in our daily diet. We can have a diet high in calcium but if we don't accompany it with an adequate dose of vitamin D, our body won't be able to absorb calcium efficiently. Calcium depends on vitamin D for its absorption. Good nutrition is important at all ages to maintain healthy bones.

Keywords: Vitamin D, Calcium, Reserves, Diet, Benefits.

VITAMIN B12 AND COGNITIVE FUNCTION

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Introduction: Vitamin B12 or cobalamin, is a water-soluble vitamin that plays a crucial role in DNA synthesis, acts as a cofactor in the metabolic processes of all human body cells (blood and nerve cells) and is involved in the processes of myelin synthesis and cognitive function. It is eliminated by the kidneys.
Objective: To elucidate the influence of vitamin B12 on cognitive function processes.
Methods: Information extracted from platforms such as PubMed and Google Scholar. Two articles were selected as the basis for this work.
Results: Vitamin B12 deficiency is due to compromised intestinal absorption due to inflammatory bowel diseases, loss of gastric intrinsic factor and the adoption of a diet in which the amounts of vitamin B12 are low. The use of proton pump inhibitors or H2 blockers can also lower levels of this vitamin. Its deficiency can lead to dysfunctional myelination, tingling sensation in the feet and hands, fatigue, rapid heart rate, cognitive impairment (cognition and memory problems such as Alzheimer's disease), and megaloblastic anemia.
Conclusion: There is a clear relationship between deficient levels of vitamin B12 and cognitive impairment, highlighting the crucial importance and influence this vitamin has on cognitive and neurological behavior.

Keywords: Vitamin B12, myelination, Alzheimer, megaloblastic anemia.

MOST COMMON MINERAL DEFICIENCIES

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Introduction: Minerals are inorganic substances widely distributed in nature and present in foods, which are essential for the homeostasis of living beings. Among all the minerals we can highlight five minerals where the most common deficiencies are detected, they are: iron, calcium, magnesium, iodine and zinc.
Goals: To determine and characterize most common minerals' deficiencies.
Methodology: Data collection carried out on PubMed, Scielo and Google Scholar.
Results: Of these five minerals, we highlight two: iron and calcium. Iron deficiency causes, among others, the inability to produce red blood cells at an adequate level, resulting in anemia. Regarding calcium, we note that its deficiency causes osteoporosis and dental problems. The insufficiency of these two minerals greatly limits the balance of our body, as they essentially affect bone, muscle, blood formation and even nerve cells. Several foods in our daily diet can prevent the appearance or development of these diseases, such as meat, spinach, cabbage, beans, dairy products and lentils. A lack of these minerals can cause muscle weakness, brittle nails and hair, joint pain, tiredness and lack of concentration. Deficiency has also been linked to an increased risk of developing cancer, type II diabetes, thyroid disease, obesity, cardiovascular disease and Alzheimer's.
Conclusion: In conclusion, based on our research and results, we can say that it is completely beneficial to consume foods, such as fruits and vegetables, and supplementation to avoid the risk of diseases caused by a deficiency in these minerals

Keywords: calcium, iron, osteoporose, deficiencies, anemia

MOST COMMON VITAMIN DEFICIENCIES

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Introduction: Vitamins play a vital role in the human body, but they are not produced internally and require adequate intake for optimal functioning. Among the most essential are vitamins A, B12, C and D.
Objectives/methodology: We carried out a search on websites such as Pubmed and Portfir to assess the main vitamin deficiencies.
Results: It is essential to maintain an adequate balance of vitamins, such as vitamin A (300- 1300 mcg RAE/day, depending on the person) found in liver, fish, eggs and dairy products; B12 (0.4-2.8 mcg/day, depending on the person) in fish, meat, eggs and dairy products; vitamin C (15-120 mg/day, depending on the person) in tomatoes, potatoes and citrus fruits, except for patients with chronic diseases; and vitamin D (10-20 mcg/day, depending on the person) obtained from sun exposure and oily fish. Deficiency of these vitamins can have serious consequences, such as xerophthalmia due to lack of vitamin A, affecting vision, megaloblastic anaemia, low blood cell counts, neural tube deformities and foetal anaemia in pregnant women due to vitamin B12 deficiency. Lack of vitamin C leads to scurvy, while vitamin D deficiency can result in osteomalacia in adults, weakening the bones, and rickets in children, causing skeletal deformities. Conclusion: Adequate vitamin intake is beneficial for health and can be achieved through foods that contain them. However, inadequate intake can have negative effects on health. It is therefore crucial to adjust the diet to ensure the correct intake of essential vitamins, preventing nutritional deficiencies and their consequences.

Keywords: vitamins, deficiencies, nutritional deficiency

IODINE IN PORTUGAL: STATUS AND IODIZED SALT CONSUMPTION

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Iodine is an essential micronutrient for thyroid function, specifically thyroid hormone synthesis, which is needed for metabolism regulation as well as overall growth and development. Inadequate iodine intake can result in a diversity of health problems, including thyroid abnormalities and developmental concerns, especially in pregnant women and children.

The goal of this study is to determine the level of iodine intake among the Portuguese population. We aim to establish the appropriateness of iodine consumption across different age groups and geographies in Portugal. In addition, we want to uncover important factors that influence iodine intake levels, such as dietary habits, socioeconomic status and geographical variances. Iodine consumption data is gathered through dietary surveys, urine iodine concentration assays, and iodine content analyses in usually consumed foods. Structured questionnaires and demographic data are used to examine socioeconomic characteristics, food habits, and geographical variances. Regional inequalities and dietary choices appear to have a major impact on iodine uptake. Furthermore, certain demographic groups, such as pregnant women and teenagers, have a higher risk of inadequate iodine intake, which raises health issues.

To summarize, the outcomes of this study highlight the significance of monitoring and correcting iodine intake levels in Portugal. Public health measures, such as iodine fortification of staple foods or targeted information campaigns, may be required to provide appropriate iodine nutrition, especially among vulnerable populations. More research is needed to fully understand the factors that influence iodine consumption differences and to create efficient strategies for ensuring adequate iodine status among the Portuguese population.

Keywords: Iodine intake, age groups, dietary habits, socioeconomic status, public health interventions.

VITAMIN B9 (FOLATE) AND PREGNANCY

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Introduction: Folic acid (vitamin B9) is mainly related to the metabolism of one carbon and one methionine, contributing to the production of methyl groups. Both cell division, the formation of red blood cells and cell growth are functions of vitamin B9 and it is therefore extremely important to monitor the recommended daily dose during the prenatal period and the first trimester of pregnancy in order to prevent neural tube malformations.
Objectives: Understand the importance and problems associated with folic acid in pregnancy.
Methodology: In order to understand the benefits and possible risks of folic acid, research was carried out using published studies from the University of Porto Medical School and scientific websites in order to answer the question raised.
Results: During pregnancy, the need for b9 increases in order to support the process of cell division in the neural tube (which gives rise to the CNS). A deficiency of this vitamin during pregnancy can lead to neurological malformations in the fetus (such as spina bifida) and spinal malformations. On the other hand, based on the analysis of studies carried out on excess folate in pregnancy, a link has been found with autism, indicating that too much of it could damage the genes that make up the maturation of the brain and cause some malformation.
Conclusion: Ensuring adequate folate intake is essential for a healthy pregnancy and for preventing complications related to folate deficiency.

Keywords: Neural tube defect, folic acid, pregnancy, folic acid deficiency and toxicity

VITAMIN C AND CANCER

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Introduction: Vitamin C (ascorbic acid) is a water-soluble vitamin that is involved in several biological and metabolic processes, such as the biosynthesis of collagen, L-carnitine, and some neurotransmitters, and is obtained through foods such as citrus fruits and vegetables. As it contains antioxidant properties: it prevents oxidative damage and helps maintain the integrity of defense cells, contributing to the prevention of diseases such as cancer.
Objectives: Understand what vitamin C is and its role in the prevention and treatment of cancer.
Methodology: Research was carried out on the topic in scientific databases such as Pubmed and the National Institute of Health, in which 5 articles were selected for this work.
Results: Vitamin C can help prevent cancer, as, due to its antioxidant properties, it promotes the formation of reactive oxygen species that can cause the death of cancer cells. The consumption of high doses of Vitamin C helps in the treatment of cancer as it induces anti-tumor effects by creating an oxidative environment for these cells. It is speculated that its intake reduces the effects of chemotherapy, such as hair loss and ulcers in the intestinal tract, but it does not only promote the evolution of healthy cells such as tumor cells.
Conclusion: The role of vitamin C in the treatment and prevention of cancer is still a topic under study, with no common consensus concluding the benefits and consequences of high doses of vitamin C in the treatment and prevention of cancer.

Keywords: Vitamin C, Cancer, antioxidant, tumor cells.

HEMOPHILIA

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Hemophilia is a rare genetic condition that leads to spontaneous bleeding, particularly in the joints, due to a deficiency in clotting factors. There are three main types: A, B and C, caused by deficiencies in factors VIII, IX and XI respectively. Although it is more common in men due to inheritance linked to the X chromosome, women can be asymptomatic carriers. The coagulation process involves the activation of platelets and a cascade of enzymatic reactions. Factor XII plays a crucial role in the enzymatic activation of factors XI, IX, VII, V and X in the intrinsic system, while in the extrinsic system, factor VII is activated and acts enzymatically on factors V and X. The diagnosis of hemophilia includes platelet counts, prothrombin time, and partial thromboplastin time. Chronic pain is a common feature, often due to intra-articular hemorrhages. Diagnosis usually involves imaging tests such as ultrasound or MRI. Nuclear Medicine can be used to perform bone scintigraphy, Radionuclide Therapies that relieve pain and PET scans that assess blood flow and perfusion.Treatment, although not curative, aims to prevent bleeding and includes clotting factor replacement therapy. This can be used for both prevention and treatment after bleeding. It is essential to personalize treatment based on weight, severity of hemophilia and coagulation levels. Progress in research and development of the new therapies brings hope for a healthier life for those affected by the disease.

Keywords: clotting factors; platelets; cascade of enzymatic; hemorrhages

THYROID DISEASE

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The thyroid is an endocrine gland, about 5 cm in diameter, located at the base of the neck, consisting of two lobes joined by a central part. Its function is to produce and release into the bloodstream two hormones, triiodothyronine (T3) and thyroxine (T4), which are produced from iodine and released by follicular cells, which control the speed of the body's chemical functions and also contribute to the regulation of various mechanisms. On the other hand, we have the C or parafollicular cell that produces calcitonin.

Hypothyroidism and hyperthyroidism are two disorders of this gland. In hyperthyroidism, the thyroid produces excessive amounts of hormones, speeding up metabolism and causing various symptoms such as increased heart rate and blood pressure, muscle weakness, insomnia, tremors, irritability, nervousness, weight loss and increased sweating. On the other hand, in hypothyroidism, insufficient amounts of hormones are produced which can cause a reduction in metabolism, leading to symptoms such as fatigue, constipation, weight gain, depression and dry skin.

There are 4 types of cancer that can appear in the thyroid: papillary, follicular, medullary, or anaplastic.

Thyroid ultrasound is an examination that allows checking the health of this gland, and small changes can significantly affect our health, impacting metabolism and other body functions. To diagnose these pathologies, as well as for medical monitoring, thyroid SPECT scintigraphy is used. In this examination, radiopharmaceuticals such as iodine- 123, iodine-131, or technetium-99 are used. The ability of this gland to capture iodine explains why it is used as a specific radiotracer.

Keywords: Triiodothyronine, thyroxine, hyperthyroidism, hipothiroidism, diagnosis

EVALUATION OF BODY COMPOSITION IN OBESITY

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Obesity is a chronic disease caused by excessive accumulation of fat that promotes health risks. This clinical condition results from an energy imbalance, where intake exceeds calorie consumption, which leads to triglyceride accumulation in adipocytes and consequently fat tissue buildup.

There are two types of adipose tissue: white adipose and brown adipose. White fat tissue produces the hormone leptin, which promotes satiety, helps inhibit hunger and regulates energy balance. In obese individuals, as a result of the increase in the existing fat mass, excessive production of pro-inflammatory cytokines is observed, as is the case of TNF-α or IL-6. In fatty tissue, TNF-α is preferably produced by macrophages and its ability to modify the action of insulin is already well described, with an increase in its levels in insulin resistance states whileining high levels of food intake and reducing energy expenditure. Fat tissue is usually stored in the abdominal region in men and in the hips and glutes in women.

Assessment of body composition can be done through imaging tests such as bone densitometry (DEXA), which uses X-rays to estimate different body masses, computerized tomography and magnetic resonance imaging, although they are limited to obese individuals.

Most imaging methods assess the distribution and quantity of fat located in each region (TC e MRI). Imaging methods to evaluate the function of this fat are still under investigation.

Keywords: obesity,disease,calories,adipose tissue,insulin resistance

CONTROL OF BLOOD PRESSURE BY THE KIDNEY - RAAS SYSTEM

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Blood pressure is the force exerted by the blood on the walls of the arteries, crucial for distributing oxygen and nutrients throughout the body. It is regulated by the Sympathetic Autonomic Nervous System and by kidneys through the Renin-Angiotensin-Aldosterone System (RAAS). The RAAS is a complex system that regulates electrolyte balance and blood pressure. When the blood pressure decreases, the kidneys release the renin enzyme, which converts angiotensinogen into angiotensin I. This is then transformed into angiotensin II, a potent vasoconstrictor that increases blood pressure, promotes salt and water retention in the kidneys, and stimulates the release of aldosterone and vasopressin. These hormones increase sodium and water retention, thus raising blood pressure. Chronic activation or dysregulation of the RAAS can lead to hypertension and contribute to the development of kidney diseases. Therefore, hypertension can be a cause or consequence of kidney disease. Additionally, the kidneys can also modulate blood pressure by secreting substances that affect arteriolar dilation, counteracting the vasoconstrictive effects of the RAAS. The consequences of high blood pressure include organ damage, especially to the kidneys, leading to atherosclerosis and renal overload. The treatment of hypertension involves the use of medications such as angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, and diuretics. The imaging techniques used, such as CT angiography, MR angiography, Doppler ultrasound, Cardiac MRI, and PET scans, while not directly used to diagnose blood pressure, neither to evaluate the mechanisms of the kidneys, are extremely valuable in evaluating the vascular system and directing treatment for related complications.

Keywords: kidneys, system renin-angiotensin-aldosterone, hypertension, blood pressure

NON-ALCOHOLIC FATTY LIVER DISEASE

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Non-alcoholic fatty liver disease (NAFLD) is defined as an excessive accumulation of fat in hepatocytes, and covers simple steatosis which can trigger processes of oxidative stress and inflammation and consequently lead to the disease progressing to more advanced stages and non-alcoholic steatohepatitis (NASH), which shows inflammation of the liver tissue and scarring (fibrosis). Over time, scar tissue accumulates, leading to cirrhosis and, in more serious cases, carcinoma.

This condition is strongly associated with metabolic syndrome, which includes factors such as excess body weight, high levels of fat in the blood and insulin resistance. The lipoprotein VLDL (very low density), whose main function is to transport triglycerides from the liver to peripheral tissues. Insulin resistance, common in NAFLD, can lead to an overproduction of VLDL in the liver, contributing to elevated blood triglyceride levels and increasing the risk of developing the disease. Overproduction of VLDL and accumulation of fat in the liver can trigger oxidative stress and inflammation processes. Although the mechanisms that transition from NAFLD to NASH are not completely known. In the areas of radiology and nuclear medicine, we can highlight the following imaging techniques for the diagnosis and quantification of hepatic fat: magnetic resonance spectroscopy, PET, SPECT, and also elastography for assessing liver elasticity and its level of fibrosis, among others.

Keywords: non- alcoholic fatty liver disease, metabolic syndrome, inflammation

RESPIRATORY SYSTEM DISEASES

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There are two types of respiratory diseases: obstructive (asthma), and restrictive (pulmonary fibrosis). Obstructive diseases present a lower Tiffeneau index, while restrictive diseases present a normal Tiffeneau index but have a forced vital capacity reduction. In obstructive lung diseases, the airways become obstructed and narrowed, limiting air flow , caused by the inflammatory response to inhaled toxins. Asthma leads to chronic inflammation, tissue damage, edema and mucus production, and hyperreactivity, which is the exaggerated increase in smooth muscle contraction, and airway obstruction. T-helper lymphocytes infiltrate the airways, leading to mast cells recruitment and histamine release, which regulates airways mucus production and inflammation.

Asthma diagnosis is essentially done through pulmonary function tests and bronchoprovocation tests, while imaging tests such as x-rays, CT and MRI are not used to diagnose but to exclude other pathologies. In restrictive lung diseases, the lungs have difficulty expanding completely during inspiration, that is, there is a reduction in lung volume due to a structural change of lung tissue, resulting in reduced lung capacity. In pulmonary fibrosis, the combination of genetic and environmental factors lead to cycles of injury and repair of epithelial and endothelial injuries, thus generating cell death and an increase in fibroblasts in this region. They differentiate into myofibroblasts, generating fibrosis, which is the scarring of lung tissue.

Diagnosis requires high-energy CT and, in some cases, lung biopsy. On chest radiography we find small cystic lesions and dilated airways where the destruction of bronchi caused by inflammation occurs.

Keywords: Lung diseases;Tiffeneau index; Asthma; Pulmonary fibrosis; Diagnosis

AUTOIMMUNE DISEASES

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Autoimmune diseases result from the dysfunction of the immune system which attacks the body's own tissues through the production of abnormal antibodies such as anti nuclear antibodies. On those diseases it is common for the immune system cells to be activated inappropriately such as T lymphocytes which help coordinate the immune response, and B lymphocytes that produce our body's immune defences against antigens.

In Systemic Lupus Erythematous the immune system attacks healthy cells and tissues leading to pain, inflammation and damage to the body. In Multiple Sclerosis the healthy tissue of the central nervous system is damaged trough antibodies that damage the myelin, substance that protects and coats the nerve fibers resulting on inflammation and damage to the fibers leading to interference in the conduction of nerve impulses. On the other hand, Rheumatoid Arthritis affects the joints and connective tissue of the body through inflammation of the synovial membrane which is a layer of tissue that lines them.

Diagnosis involves physical examinations, clinical history and laboratory tests such as detection of antibodies, inflammatory factors and cerebrospinal fluid analysis. Medical imaging plays a crucial role in diagnosis and also in monitoring. Radiography and ultrasound for Rheumatoid Arthritis due to the ability to detect synovitis and bone erosion in the pre radiographic phase. Magnetic Resonance imaging for Multiple Sclerosis due to the high degree of resolution in soft tissues.

Treatment is only aimed to control symptoms and reducing damage.

Keywords: Antibodies, Immune System, Inflammation

INFLAMMATORY BOWEL DISEASES

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Inflammatory Bowel Diseases (IBD), which include Crohn's Disease and Ulcerative Colitis, arise from a complex interplay of physiological, and biological factors.

In Crohn's disease, an inadequate immune response is triggered by immune system dysregulation, resulting in the activation and recruitment of immune cells such as T lymphocytes, macrophages, and dendritic cells to the intestine. This leads to the release of pro-inflammatory cytokines, such as TNF-α, IL-12, and IL-23, triggering a chronic inflammatory response in the gastrointestinal tract. This chronic inflammation causes tissue damage, including ulcers, strictures, fistulas, and abscesses in the digestive system, resulting in gastrointestinal symptoms such as abdominal pain, chronic diarrhea, rectal bleeding, and weight loss. Additionally, chronic inflammation can affect the enteric nervous system, resulting in neuromuscular dysfunction that contributes to symptoms such as impaired intestinal motility and abdominal pain. In the endocrine system, chronic inflammation can cause alterations in hormonal levels, influencing appetite, metabolism, and stress response. Furthermore, systemic inflammation associated with Crohn's disease may increase the risk of cardiovascular diseases, such as atherosclerosis.

Treatment options for inflammatory bowel disease (IBD) include anti-inflammatory drugs and surgery like colectomy. Early diagnosis and treatment are vital to prevent complications and enhance quality of life. Diagnostic procedures, such as colonoscopies, CT scans, and MRIs, are crucial for identifying and monitoring IBD, along with physical exams and lab tests. Integrating artificial intelligence into medical practice improves diagnosis and treatment planning.

On a final note, we aim to bring knowledge to everyone, to prevent people from this condition.

Keywords: Inflammatory, treatment, chronic

STRATEGIES AND FACILITATIVE BARRIERS OF COMMUNICATION IN DEAF CHILDREN

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Introduction - The greatest communication of the deaf is done through sign language. During the first year of life, or later, deaf children acquire linguistic and non-linguistic information, i.e. they need to learn to divert their attention and make the connection between two consecutive visual stimuli. To do this, there are some barriers, but also strategies that make it easier.
Objectives -To identify strategies and barriers that facilitate communication in deaf children.
Methodology - A search was carried out in Web Of Science, Scielo and Google Scholar, and thus we included 5 articles on the subject. In the inclusion criteria, articles dated more than 2015 that addressed the theme in the chil population were included.
Results - One way to increase the linguistic accessibility of caregivers when interacting with a deaf child is through visual communication strategies. Some strategies are based on explicit/implicit and attentional strategies, oralism, total communication and bilingualism, lip reading, writing and gestures. The biggest barrier remains the non-acceptance of sign language.
Conclusion - In general, deaf parents prefer tactile and implicit strategies, while hearing parents use oral language. Communication is, therefore, a preponderant factor for the development of deaf children in the school environment, in emotional, cultural and intellectual development. However, most deaf people and their caregivers do not believe in the success of alternative communication strategies and yearn to have sign language interpreters in public services, mediating communication between them and professionals.

Keywords: Strategies; Deafness; Sign language; Barriers; Communication

SOCIALIZATION ASPECTS OF DEAF PEOPLE, FROM SCHOOL TO PROFESSIONAL LIFE

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Introduction: Hearing is key in the development of individual communication and learning capabilities. Deafness, especially if not diagnosed early, can affect an individual's psychological, social and emotional development. In the workplace, deaf individuals report oppression and discrimination incidents. The social inclusion of deaf children and adults, and the development of strategies that help with their socialization, is extremely important to reduce these adversities.
Objective: Research aspects of socialization of deaf people from school to professional life, as well as various integration strategies.
Methodology: The following databases were used: Web of Science and Google Scholar. As inclusion criteria we considered articles dating after the year 2000 and deaf individuals and their development from school life to professional life. The used keywords were: Deafness, children, socialization, professional life, young adult, learning.
Results: It is clear that deaf children have difficulties in terms of social competence, having worse prosocial behavior and isolating themselves more. In the workplace, deaf individuals tend to work more than their normal-hearing colleagues, suffering from discrimination and limited promotions.
Conclusion: The existence of difficulties in social capabilities of deaf children when compared to their normal-hearing peers is noticeable. The adaptation of appropriate teaching methods by teachers is essential for a better development of the individual's social and educational level, as well as their integration in the workplace.

Keywords: Deafness; children; adult; socialization; work life; education

CULTURES AND IDENTITY OF THE DEAF COMMUNITY

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Introduction- Deafness is more than just a matter of auditory ability, it is part of a social minority; as a result, deaf individuals seek recognition of their own identity. For this, it is extremely important for them to be in contact with the deaf community, as this allows them to feel seen, heard, and accepted. Over the years, they have come a long way, full of adversities; however, they have been able to overcome them and integrate into the “hearing society”.

Objective - To know and understand the culture and identity of the deaf community as well as their integration into the society.

Methodology -To carry out our work, we conducted a research of articles on the Google Scholar and B-on platforms that addressed deaf community cultures and identities, as well as blogs and websites discussing the same topic.

Discussion - The culture of the deaf is special and unique, with its own traditions and shared values. These build their identity through sign language and their shared experiences, creating a strong sense of community. It is important to value and promote deaf culture to enhance the inclusion of this community in society.

Conclusion - With this work, we were able to perceive the significant evolution that the deaf community has suffer over the years, overcoming various challenges to reach its current state of progress.

Keywords: Deaf Community, Society, Portuguese Sign Language, Culture, Charles-Michael de L’Epée.

INCLUSION OF CHILDREN AND YOUNG PEOPLE WITH DEAFNESS IN PORTUGUESE SCHOOLS

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Introduction - The role of the Portuguese Sign Language (LGP) teacher is fundamental in guaranteeing access to LGP from the first years of life, promoting linguistic development and the personal, academic and social success of deaf children. Inclusion is essential in the educational context, as it emphasizes the need for inclusive schools for all students, especially those with disabilities.
Objectives - To analyze inclusion techniques and strategies adopted in Portuguese schools for children and young people with deafness.
Methodologies - Review and consultation of scientific articles related to the topic. It was used Web of Science and the IPC's Common Repository as search engines. To aid research, we used the following keywords - inclusion, deafblindness and Portuguese schools.
Results - LGP is described as the most common medium used in schools to communicate with deaf students. Alternatively, there is also the use of visual aids, interactive games, promotion of writing, body expression, speech reading and auditory discrimination. However there are many difficulties such as the LGP teacher limitation and few visual aids.
Conclusion - After the literature review, we conclude that the teaching mandatory of the Portuguese Sign Language in portuguese schools from the pre-schooler fase onwards, in the future, will help any deaf person to communicate with everyone else more effectively.

Keywords: hearing loss, inclusion, LGP, young people, schools

THE IMPORTANCE OF LINGUISTIC ACCESSIBILITY IN THE INCLUSION OF DEAF PEOPLE IN EDUCATION

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Introduction- Considering the limits and advances of inclusive educational policies for linguistic accessibility. In the day-to-day life of a deaf person, they face many difficulties because society is organized for hearing people and not for the deaf population. Hence the importance of combating this fact so that everyone has the same rights and possibilities. With this in mind, it is necessary to change linguistic accessibility, especially in places of education, as this is the first milestone in shaping each individual's way of thinking and their integration into society.
Objective- Analyze the importance of linguistic accessibility in the inclusion of deaf people in society, starting with education.
Methodology- A search on the subject was carried out on Google Scholar, using articles from the last seven years as inclusion factors and using the keywords: linguistic accessibility, deaf population and teaching.
Results- As a result of a technological process, teaching practices have advanced radically due to the need to communicate, interpret and translate academic texts. The practices that have been carried out, despite the positive results, are still insufficient to meet the needs of this population.
Conclusion- Although the advances in linguistic accessibility provided by proposals that make up public policies on deaf education and the efforts of many to combat this problem are evident, there is still a long way to go, and there is a need for constant reflection on the development of institutional strategies that contribute to the quality of learning.

Keywords: Teaching, deaf population, technology, sign language

HOW TECHNOLOGY MAKES LIFE EASIER FOR DEAF PEOPLE IN THE COMMUNITY

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Introduction: Throughout human history, deaf people have been excluded from society. Deaf people need greater care when using medical terms, which is why greater attention is needed in communication in order to facilitate information being assimilated effectively.
Technological evolution is increasing and allows the use of new resources in healthcare practices, such as information and communication technologies (ICT). Advances in technology make it possible to build educational tools on various topics using sounds, texts, videos.
Objective: To analyze how the advancement of technology has made lives of deaf people easier.
Methodology: A bibliographical search was carried out through Google Scholar and Web of science, using the keywords technology, deaf, health, communication, only articles dated after 2017 were included.
Results: The deaf community faced a language barrier, but information and communication technologies (ICT) has proven to be a great ally. For example, messaging and video calling applications, texts voice calls and video calls and applications for Portuguese Sign Language (LGP).
Conclusion: Aside from hearing aids and cochlear implants, most technology was not specifically designed to break down auditory and communication barriers. However, technology plays a crucial role in the community, offering innovative solutions to facilitate communication and accessibility.

Keywords: Keywords: technology, deaf , health, life, communication

THE IMPORTANCE OF CERTIFICATION - CONSUMER PERCEPTION

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In a world where trust in the safety and origin of food is crucial, certification plays a fundamental role. By choosing certified products, consumers have guarantees regarding the procedure and compliance with established standards, strengthening the relationship between producer and consumer.

This study aims to investigate the relevance of certification from the consumer's perspective, focusing on their perception and impact on purchasing decisions.

The methodology used included a literature review and a questionnaire.

The results reveal that the majority of respondents (82%) confirm certification as a seal of quality for products and services, demonstrating a solid understanding of the concept. The predominant association (80.9%) between food certification and increased confidence in the safety and origin of food highlights the importance of this process in ensuring high standards. Despite the recognition of the benefits of certification, 66.3% of respondents do not share it as a decisive value when purchasing products. The majority of respondents (98.9%) know how to correctly identify a certified product using the certification seal.

Furthermore, certification is perceived as a driver for more sustainable practices, with 71.9% of respondents believing that this positively influences consumer behavior towards conscious choices.

It is concluded that certification plays a vital role in building consumer confidence, although there is scope for greater awareness. This could promote more informed and confident choices when purchasing.

Keywords: Certification; Trust; Security; Conformity

CERTIFICATION IN AGRI-FOOD COMPANIES

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Quality food certification is essential for the health and well-being of all consumers and is fundamental for social and economic stability. Certification can be defined as "the procedure by which an accredited third part provides a written guarantee that a product, process, service or system complies with specified requirements", based on inspections and audits.
The objective of this article is to understand the business perspective on food certification, from the farm to the final consumer.
This work was conducted by analyzing scientific articles and applying a survey to agro-food companies in order to understand the benefits and barriers of food certification.
In the survey, we received 5 results, 60% of which corresponded to the industrial sector and 40% to the commercial sector. From the results, the largest proportion of companies (60%) do not have any type of certification, while 40% have some type of certification. We also had high responses regarding the benefits for the company, such as "increased sales" and "increased opportunities", with 100% of responses.
Therefore, certification improves the efficiency of companies in the production process (shorter deadlines, lower defect rates and reduced costs), increases quality control which leads to higher customer confidence and health, strengthens employee awareness, motivation and productivity as well as a clearer division of responsibilities.

Keywords: Certification, Business, Agriculture, Food, Quality

LEVEL OF KNOWLEDGE AND GOOD CERTIFICATION PRACTICES IN BAKERIES

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Food certification in establishments plays a crucial role in guaranteeing food quality, safety and compliance. Certifications are obtained through rigorous assessments and auditing processes, and address a variety of areas, from food hygiene and safety to sustainability and food commercial. The advantages of having food certifications include ensuring high standards of food production and processing, access to specific markets and building trust and credibility with consumers.

The aim of this study was to understand the essential principles of food certification, to assess the level of knowledge of the different entities on this subject and to understand their level of action. The methods used were based on the help of scientific articles and websites and the application of a questionnaire to three bakeries. Thus, of the three bakeries surveyed, two had food certification. As for the measures that should be adopted to achieve food quality objectives, all responded that cleaning and decontamination facilities and equipment (100%) was a measure to guarantee food safety and two responded that food should be kept at safe temperatures (66.7%) as well as implementing a pest control system (66.7%). When it comes to advantages, they all agree that compliance with food regulations and laws is an asset for the establishment (100%).

It is therefore clear that food certifications play a significant role in the various establishments, providing trust, transparency and credibility to their consumers.

Keywords: Food certification; Bakeries; Food safety; Hygiene; Good practices.

IMPORTANCE OF FOOD CERTIFICATION UM RESTAURANTS

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Food certification is a system that companies can adopt voluntarily, being a set of measures and requirements that must be followed in the food industries and catering establishments. Its purpose is to ensure the quality of food and ensure that it complies with regulations. Although not legally mandatory, certification is beneficial for establishments as it demonstrates that food meets quality, environmental, and other relevant management system standards. In carrying out this work, the methods used were based on a literature review of the subject and on subsequent data collection, through the application of a questionnaire to the population, where we obtained a sample of 120 people. It was our objective with this work to discuss, comment and advise the importance of addressing this topic, given that the presence of food certification is a subject of extreme global importance. It is essential that people gain more knowledge and attend catering establishments with food certification, which implies raising awareness among the population to ensure better safety of the population's health and well-being. Respondents show more confidence in establishments that have food certification, associating this with better hygiene and food safety. And, therefore, the majority were interested in knowing if an establishment has this certification. However, it is notable that most people attend food-certified establishments only occasionally. In addition, it is clear that the majority of respondents believe that the quality of an establishment is directly linked to the presence and type of certification it has.

Keywords: Food Certification, Catering Establishments, Consumers, Food Quality and Safety

ATRIAL FIBRILLATION AND STROKE

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Stroke is a medical condition that affects brain arteries, resulting in a disruption of blood flow to the brain. In Portugal, it is the primary cause of mortality and disability.

There are two types of stroke: ischemic and hemorrhagic. The most common is ischemic stroke which can be caused by a clot obstructing the blood flow to the brain. Furthermore, there is also hemorrhagic stroke, which is characterized by the rupture of a blood vessel, preventing blood from reaching certain areas of the brain.

The effects of a stroke depend on several factors, including the location of the obstruction and how much brain tissue is affected.

Atrial fibrillation is one of the most common supraventricular tachyarrhythmia, characterized by irregular heartbeats resulting from disorganized electrical activation of the atria compared to the ventricular activation. In these cases, the atria “fibrillate” causing ineffective contraction and compromising the blood circulation within the heart, thus increasing the risk of thrombus formation and, consequently, a stroke, for example.

This poster will explain how having atrial fibrillation can greatly increase the risk of stroke, detailing the processes involved, as well as emphasizing the importance of controlling this type of arrhythmia to prevent a stroke.

Keywords: Atrial Fibrillation, Stroke, Prevention

EFFECTS OF THE TESTOSTERONE IN THE CARDIOVASCULAR SYSTEM

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Testosterone is one of the most powerfull and one of the most mysterious hormones of the human body. It's knowned to cause males to reproduce,although being an apperantly simple role it's actually quite complex. Enables males to have a more instinctive behaviour of liking to deal with danger and embracing more physical responsabilities, while having a crucial role to maintain the levels of fertility stable. It's been proven that is an incredibly important factor to enable males acceptance levels of interpersonal bonding even more when it's a male to male interaction making testosterone relevant in social coexistence. And it has been studied that is responsible for the quality and quantity of sperm produced by men. The deficits of this hormone usually show male genitalia with clear underdevelopment and size. Less testosterone usually means less sperm cells, thereby less sperm cells with actual levels of normal and healthy genoma.

About 37% of patients with a history of AMI and consequent heart failure show marked testosterone deficiencies. With advancing age, testosterone levels, decline significantly, leading to a decrease in muscle mass and strength. These impairments can often be partially reversible with Testosterone Replacement Therapy (TRT). Lower levels of testosterone in the blood induce an increase in vascular resistance, which lowers elasticity of blood vessels and the physiological capacity of blood circulation to reach vital organs and body systems.

There is a natural decline of about 1% post-30 years in young adults regarding their intrinsic concentrations of this hormone in their bodies.

Keywords: Testosterone, Cardiac insufficiency, Myocardial infarction

TAKOTSUBO: THE BROKEN HEART SYNDROME IN COVID-19 PATIENTS

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The Takotsubo Syndrome, also known as the broken heart syndrome, classically presents as an acute cardiac emergency, often mistaken for myocardial infarction. It was first reported as a reversible cardiomyopathy in which the abnormal contractility of the ventricle resembled the Japanese fisherman's octopus trap – the takotsubo. The classical pattern of the left ventricle regional wall motion abnormality is apical and midventricular dyskinesia, akinesia or hypokinesia with basal hyperkinesia, giving the appearance of "apical ballooning" at end-systole. This condition is a clinical syndrome characterized by an acute and transient left ventricular systolic dysfunction related to an emotional or physical stressful event. It characteristically affects women in the sixth decade of life, presenting with acute-onset chest pain, dyspnea, abnormal cardiac enzymes, and electrocardiogram (ECG) changes. The most common changes at the ECG resemble an acute coronary syndrome, such as widespread ST-segment elevation and T-wave inversion, and left bundle-branch block pattern. Plasma cardiac troponin concentrations will also be typically raised, although peak values are lower than in patients with ST-segment elevation myocardial infarction.

Some cohort studies have shown that the incidence of takotsubo syndrome has been increasing in the general population due to the modern life stressors and the greater awareness of this condition. In fact, during the Coronavirus disease 2019 (COVID-19) pandemic, the incidence of cardiovascular complications has increased, including the diagnosis of takotsubo syndrome, both population-wide and in patients diagnosed with COVID-19. Our focus will be on two clinical cases of patients initially diagnosed with SARS-CoV-2, a seventy-four year-old female with a medical history of systemic hypertension and overweight and a seventy-six year-old male with medical history of type 2 diabetes mellitus and current smoker. Both developed clinical complications that led to the diagnosis of takotsubo syndrome.

Keywords: COVID-19; Takotsubo syndrome; Stress cardiomyopathy

BRUGADA SYNDROME

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Brugada syndrome is an "inherited" condition characterized by predisposition to syncope and cardiac arrest, predominantly during sleep. Is characterized by electrocardiographic right bundle branch block and persistent ST-segment elevation in the right precordial leads. It is associated with ventricular fibrillation and a high risk for sudden cardiac death. Is more commonly diagnosed in young to middle-aged males with structurally normal hearts, although patient sex does not appear to impact prognosis.

Electrocardiographic patterns can occur both spontaneously or after pharmacological induction. Some of these drugs including sodium channel blockers, beta-blockers, tricyclic antidepressants, lithium and cocaine. Most alterations (18-30%) are caused by the SCN5A gene, that controls the structure and function of the cardiac sodium channel. In most cases, there are no symptoms. However, palpitations, fainting, nocturnal agonal breathing, cardiac arrest, and in more severe cases, it can lead to sudden death may occur.

The initial diagnosis of Brugada syndrome is based on a typical ECG pattern, the type 1 Brugada ECG pattern. This features prominent ST segment elevation (≥ 2 mm) in V1 and V2 (sometimes involving V3) with QRS complexes resembling right bundle branch block in these leads. The ST segment is upwardly concave and descends into an inverted T wave (> 1 mm).

An implantable cardioverter-defibrillator (ICD) is the mainstay of treatment of Brugada syndrome patients. Pharmacological treatment with antiarrythmics is also an option, such as radio frequency ablation.

Keywords: Brugada Syndrome, Arrhythmic events, Ventricular fibrillation

SUDDEN DEATH IN SPORTS

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Athletes are frequently seen as examples of excellent health and above average of normal physical condition. However, the rare but worrying occurrence of sudden cardiac death (SCD) in athletes raises a crucial question: is sport a symbol of health or a risk of death? Sports practice, when performed correctly, is indeed an indicator of health. However, if practiced vigorously, especially in people who do not exercise regularly, or in the presence of undiagnosed cardiovascular diseases, it can represent a significant risk of death.

Progress has been made, but much still needs to be done to make competitive or recreational sports safer both for patients with known heart disease and for athletes without known or suspected heart abnormalities.

It is crucial to identify possible heart problems through pre-participation screening (PPT). Through medical and family history, physical examination, and diagnostic tests such as: Electrocardiogram, Echocardiogram, Stress test, and other imaging tests (Cardiac MRI). These tests should be able to detect cardiac disorders that could lead to SCD. In addition, it is essential to plan a rapid and effective response in emergency situations to ensure the safety of athletes.

The main causes of death in athletes are hypertrophic cardiomyopathy, arrhythmogenic right ventricular dysplasia, congenital coronary anomalies (in >75% the onset is sudden death), channelopathies (Brugada syndrome, long QT syndrome and catecholaminergic polymorphic ventricular tachycardia), commotio cordis (ventricular fibrillation resulting from chest trauma), myocarditis and Marfan syndrome.

In conclusion, although athletes are generally considered to be models of health and fitness, the incidence of SCD highlights the need to take preventative measures. It is essential to be aware of the problem, diagnose it early and act quickly to reduce the risks and protect the health of athletes and active individuals.

Keywords: Eletrocardiogram; Sudden Cardiac Death; Sports

TORSADE DE POINTES

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Torsade de Pointes (TdP) is a type of polymorphic ventricular tachycardia associated with QTc prolongation. TdP is characterized on the electrocardiogram by oscillatory changes in amplitude of the QRS complexes around the isoelectric line, beginning when an ectopic beat (trigger) is generated during a prolonged repolarization phase, known as an R on T phenomenon. The rhythm may terminate spontaneously or may degenerate into ventricular fibrillation, with sudden death in 10% of patients. After diagnosis it is essential to control potential trigger factors in order to minimize the risk of fibrillation. In case of fibrillation the treatment is similar to other cardiac arrest situations. We present the case of a 78-year-old female who went to the emergency room complaining of recurrent syncope. She presented profound bradycardia (35 bpm) and blood pressure of 100/60 bpm. The initial electrocardiogram revealed atrioventricular dissociation with ventricular escape rhythm and QT prolongation (QTc of 592 ms). A dual-chamber pacemaker was implanted on the next day in VDD mode. Twelve hours after the pacemaker was implanted, the patient suddenly collapsed with polymorphic ventricular tachycardia identified on EKG. The analysis of pacemaker register showed that polymorphic ventricular tachycardia was triggered by a pacing stimulus. After the acute event a prolonged repolarization phase was identified, pointing to a previously undiagnosed QTc prolongation. TdP is a silent and lethal condition, with a challenging diagnosis. It involves a QTc prolongation that with triggering conditions may induce a polymorphic ventricular tachycardia or cardiac arrest.

Keywords: Torsades de Pointes, Ventricular fibrillation, Polymorphic ventricular tachycardia

WOLFF-PARKINSON-WHITE SYNDROME

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Wolff-Parkinson-White (WPW) syndrome is characterized by the presence of an accessory pathway (PA) for atrioventricular conduction. It is the most common form of ventricular pre-excitation, which is because the conduction can be carried out by the AV node and/or the PA.
The PA can be classified based on their location, type, and direction of conduction.
The diagnosis of this syndrome is based on electrocardiographic findings, like short PR interval, wide QRS and delta waves.
Some of the symptoms the patients have are due to tachyarrhythmias, that are caused by the ventricular pre-excitation, and include palpitations, dizziness, thoracic discomfort, pre-syncope, dyspnea, and there's risk of sudden death. However, most of the patients are asymptomatic, and their diagnosis is generally made through routine exams.
As to therapeutics, there are pharmacological and surgical options, or catheter ablation. The choice of treatment is based on the assessment of the patient, however the treatment is usually only for symptomatic patients.

Keywords: Wolff-Parkinson-White syndrome, Accessory pathway, Pre-excitation

VITAMIN K AND COAGULATION

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Vitamin K is a fat-soluble vitamin found in foods and supplements and plays a crucial role in blood clotting and bone metabolism. There are two main forms: phylloquinone (K1), present in green leafy vegetables, and menaquinones (K2), in fermented foods and of animal origin.

The coagulation cascade is an enzyme system that forms blood clots in response to vascular injury. It is divided into intrinsic and extrinsic pathways, converging on a common pathway. Vitamin K acts as a cofactor for the activation of coagulation factors, such as prothrombin (Factor II), factors VII, IX and X, which are essential for the formation of clots.

Therefore, vitamin K plays a crucial role in the coagulation cascade, acting on the activation of factors dependent on it and ensuring the adequate formation of blood clots when necessary and maintaining the organism's hemostatic balance.

Vitamin K deficiency can lead to problems such as bleeding (in the skin, nose, stomach or urine) and osteoporosis, since a lack of vitamin K can cause the decarboxylation of osteocalcin, which is very important to make the connection “calcium to the bone structure”, thus strengthening the skeleton and cartilage. The causes include inadequate diet, intake of certain medications and intestinal changes, with newborns being the most susceptible age group. Reference values recommend a daily intake of 120µg/day for men and 90µg/day for women, essential for the effectiveness of anticoagulants.

Keywords: Vitamina K; Coagulation Cascade; Blood Clotting; Proteins

IODINE SOURCES AND ITS METABOLISM

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Iodine is essential to create thyroid hormones related to cell metabolism, preventing diseases related to this gland, such as hyperthyroidism. Also, promotes fetal growth and the development of the nervous system; eliminates fats that are in excess in circulation and has the function of controlling the body's metabolic processes, such as regulating the basal metabolic rate and body temperature. Seaweed, seafood, fish, eggs and human breast milk are the best sources of iodine, while the poorest sources are plant-based, such as fruits and vegetables.

The iodine excess may be caused by consumption of over iodized salt, drinking water and milk rich in iodine. Individuals with previous thyroid diseases are more vulnerable. Excess iodine intakes may cause hyperthyroidism, goiter and thyroid autoimmunity. Hyperthyroidism is caused by the excess production of thyroid hormones that are released into the bloodstream. This condition affects several organs and functions of the body and is a common disease that affects more females. Goiter is caused by thyroid hyperplasia following overstimulation by thyroid stimulating hormone, which is secreted from the pituitary gland in response to changes in circulating thyroid hormones. The major manifestations of autoimmune thyroid disease are Graves' disease and Hashimoto's thyroiditis (hyperthyroidism and hypothyroidism, respectively) which are defined as a dysregulation of the immune system.

Iodine deficiency occurs when the thyroid may no longer be able to synthesize sufficient amounts of thyroid hormone causing hypothyroidism which increases cholesterol levels. Without enough thyroid hormones, many of your body's functions slow down.

Keywords: Iodine function; Iodine Sources; Iodine Excess; Iodine Deficiency

PROTEIN CONSUMPTION AND ACUTE KIDNEY DISEASE

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The kidney is responsible for multiple functions, the main one being the regulation of plasma composition through three fundamental processes: blood filtration, reabsorption and secretion in the renal tubules, and the elimination of ions/toxins, such as creatinine and excess urea.

Acute kidney disease is a condition that leads to a decrease in the kidney's ability to filter metabolic waste from the body and consequently to its accumulation in the blood. This condition causes episodes of kidney failure and damage, which can result in kidney failure, with the main indicators of the disease being high levels of creatinine and urea. The main symptoms are confusion, dehydration, diarrhea, nausea and vomiting.

Protein supplements are increasingly sought after to maximize optimal protein intake. Excessive protein consumption can overload the kidneys, leading to a decrease in the glomerular filtration rate and the development of acute kidney disease, causing an exaggerated urea production.

Urea is filtered and eliminated by the kidneys and in excess, it can cause various harm to the body, such as toxicity to the central nervous system, cardiac arrhythmias, and bleeding in the gastrointestinal tract, which may lead to the formation of uric acid crystals, kidney stones or gout attacks.

The recommendation must be individualized, considering the person's age, underlying illnesses, activity, and goals. General recommendations are: Children 1.5 g/kg, Adults 0.8 g/kg, and Elderly people between 1.0 and 1.2 g/kg.

Keywords: Acute kidney disease, urea, creatinine, protein consumption

NON-ALCOHOLIC FATTY LIVER DISEASE

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Non-alcoholic fatty liver disease (NAFLD) is identified by an excessive accumulation of fat in the liver, unrelated to alcohol consumption. It is one of the first complications of obesity. The risk factors include insulin resistance, type 2 diabetes, and metabolic diseases. Hence, that's why it has recently been renamed metabolic dysfunction-associated fatty liver disease (MAFLD). Insulin usually inhibits the release of fat from fat cells, except for individuals with insulin resistance, where fat is released into the bloodstream and is subsequently taken up by liver cells (hepatocytes). Blood glucose also promotes lipogenesis, which is the synthesis of fatty acids and triglycerides that are later stored in the liver. Additionally, sugar prompts the liver to produce acetyl coenzyme, which produces cholesterol. In non-alcoholic fatty liver disease, hepatocytes accumulate excess fat, known as steatosis. Continuous accumulation of fat leads to inflammation and progression to non-alcoholic steatohepatitis (NASH). When these dead cells are replaced by collagen fibers (fibrosis), it leads to liver dysfunction (cirrhosis) and increases the risk of liver cancer (hepatocarcinoma). It is typically an asymptomatic disease but can cause fatigue, abdominal pain, an enlarged liver, and jaundice in more advanced stages. There is still no pharmacological treatment for this disease. However, a balanced diet and exercise can help prevent it. Such a diet includes consuming fruit, fiber, salmon, and foods rich in vitamin C and E, as well as antioxidants with anti-inflammatory qualities that prevent fat accumulation. It is also important to avoid alcohol, foods high in fat and free sugar.

Keywords: Liver, Fat, Metabolism, insulin, steatosis.

GLYCEMIC INDEX AND INCRETIN EFFECT

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The glycemic index indicates the speed with which the carbohydrates present in a food will produce an increase in blood sugar levels, more specifically, blood glucose. This index indicates the quality, not the quantity of free sugars present in food. Carbohydrates are transformed into glucose through digestion and glucose is then transported into the cells by insulin.

Oral administration of glucose induces a greater increase in insulin secretion than intravenous administration. This phenomenon is called the incretin effect. As glucose passes through the gastrointestinal tract, incretin hormones are released. The hormones responsible for the incretin effect are GLP-1 and GIP, which induce the release of insulin in the presence of glucose. After eating carbohydrates, glucose remains in the bloodstream for a long time, which can lead to blood sugar fluctuations and a spike in insulin levels. This, together with the glycemic index, can lead to cell resistance to insulin absorption and, subsequently, to the exhaustion of insulin-producing cells. This effect tends to be defective in patients with type 2 diabetes.

Studies indicate that a diet based on foods with low Glycemic Index levels reduces the risk of developing type 2 Diabetes Mellitus. Also, incretin hormones play an important role in regulating postprandial glucose homeostasis by increasing insulin secretory responses.

Keywords: glycemic index, insulin, incretin effect, glucose, diabetes

SATIETY AND APPETITE MECHANISMS

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Appetite is regulated by a complex system of central and peripheral signals which interact in order to modulate the individual response to nutrient intake. The structure responsible for its regulation is the hypothalamus, a crucial structure for regulating appetite, metabolism and energy balance. Within the hypothalamus, we find two main groups of neurons in the arcuate nucleus that play opposite roles in regulating appetite: orexigenic neurons, related to appetite stimulation, and anorexigenic neurons, related to satiety. Orexigenic neurons express neuropeptide Y (NPY) and agouti-related protein (AgRP) and are stimulated by ghrelin. Ghrelin, the "hunger hormone", is produced by the stomach. This is secreted in response to fasting and stimulates appetite, thus promoting food intake.

On the other hand, anorexigenic neurons express pro-opiomelanocortin (POMC) and CART promote the synthesis of alpha-melanocyte stimulating hormone (α-MSH). This binds to melanocortin 4 receptors, promoting a reduction in food intake. In the intestine, the hormones GLP-1, CCK and peptide YY (PYY) are secreted after a meal and are activators of such neurons, being their role to signal satiety to the brain. Adipose tissue physiology plays a significant role in the production of hormones essential for controlling food intake, energy balance and insulin sensitivity. Leptin, produced by it, acts as a signal of satiety, indicating to the brain the levels of fat stored in the body. When leptin levels are elevated, appetite is suppressed and satiety is promoted.

Thus, the balance between orexigenic and anorexigenic pathways plays a fundamental role in regulating appetite and satiety.

Keywords: orexigenic neurons; anorexigenic neurons; satiety; appetite

BRONCODILATORS

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Bronchodilators are essential substances in the treatment of chronic obstructive pulmonary diseases, acting directly on the smooth muscle cells of the bronchi and relaxing them. There are several classes of bronchodilators, each used for different conditions. The agonists are divided into the short-acting SABA (4 to 6 hours) and the long-acting LABA (12 hours) and the ultra-long-acting LABA (24 hours).

SABA are recommended for the immediate relief of acute symptoms within a few minutes. LABA are always prescribed with corticosteroid therapy, and are used when corticosteroid treatment doesn't work. All agonists bind to the β2-adrenergic receptor, relaxing muscle cells, with tachycardia and hypertension as side effects. Methylxanthines are recommended when long-acting β2-agonists or corticosteroids fail to control the disease, inhibiting phosphodiesterase and adenosine. However, the therapeutic and toxic doses are very close, making their use dangerous. Mast cell stabilizers act in the prophylaxis of asthma attacks by inhibiting mast cell degranulation, leading to a reduction in airway hypersensitivity, which can cause poor therapeutic adherence. Anticholinergics block the binding of acetylcholine to muscarinic receptors 1 and 3, which prevents smooth muscles from contracting and can cause confusion and blurred vision.

Leukotriene modifiers are effective in asthma and allergic rhinitis, preventing the action of leukotrienes. There are 2 types, leukotriene receptor agonists and 5-lipoxygenase enzyme inhibitors, which can cause gastrointestinal disorders and headaches.

Keywords: Bronchodilators, asthma, leukotriene, Methylxanthines

ANTIAGGREGANTS AND ANTICOAGULANTS

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Antiaggregants and anticoagulants are used to avoid the platelet aggregation and to prevent the occurrence of thrombi by intervening on the coagulation cascade. The main difference between these two kinds of drugs: while one aims at the early prevention of anti-aggregation of the platelets, the other steps into the mechanism of the blood clot conformation itself.

The most known examples of antiaggregant and anticoagulant substances are acetylsalicylic acid (AAC) and warfarin, which differ in the mechanism of action in the body. AAC acts by inhibiting the synthesis of thromboxane A2 by inactivating COX 1 and promoting the displacement of chemical mediators in favor of the anti-binder effect of prostacyclins, the effects persist throughout the life of the platelet, so that we can say that AAS is the only medicine that inhibits the functions of the platelets irreversibly. The mechanism of action of warfarin consists of the inhibition of the synthesis of vitamin K-dependent coagulation factors, preventing their synthesis by inhibiting the vitamin K activating enzyme, the epoxy reductase, after the administration of warfarin, there is a decrease in their plasma concentration.

Recently a new generation of anticoagulants has been developed, it's as effective as warfarin and can be easier to use because it doesn't require routine blood tests.

The importance and use of these kinds of drugs is unquestionable regarding the prevention and treatment of patients with several cardiovascular diseases or at imminent risk of stroke, embolisms or heart attacks.

Keywords: Antiaggregants, Anticoagulants, Acetylsalicylic acid, Warfarin, Cardiovascular diseases

MECHANISMS OF CONTRACEPTIVE METHODS

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Hormonal contraceptives work in various ways to prevent unwanted pregnancies overall, it is the decidualization of the endometrial bed and the suppression of mitotic activity. Hormonal methods with progesterone are subdermal implants, intrauterine devices, injectables and pills. Combined hormonal (progesterone and estrogen) methods are pills, patches and the vaginal ring.

There are various types of combined pills depending on the deprivation bleeding, which can be continuous, i.e. without bleeding; discontinuous, with a cyclical dose being monthly; or extended cyclical. The vaginal ring is inserted into the vagina, where the hormones are slowly released. Subdermal implants are applied subdermally to the arm. The intrauterine device (IUD) is a device that alters the lining of the uterus and does not allow implantation. Depot medroxyprogesterone acetate (DMPA) is a long-acting intramuscular injectable contraceptive.

Emergency contraception is used when other contraceptive methods fail and unprotected sex occurs, which can prevent or delay ovulation. The mechanism is the same as for combined contraceptives. It does not prevent pregnancy. Estrogen informs the pituitary gland not to stimulate the ovary through negative feedback. This process occurs in the hypothalamus and pituitary by suppressing the peak of luteinizing hormone (LH) along with a decrease in the frequency of gonadotropin-releasing hormone pulses, and suppression of folliculogenesis and Follicle Stimulating hormone (FSH). Progesterone has the same effect. In high concentrations, there is a greater chance of triggering an inhibition of folliculogenesis in the hypothalamus. On the other hand, at lower concentrations it decreases the concentration of LH in the pituitary gland, preventing ovulation.

There are principal advantages as prevent unwanted pregnancies, regulate menstrual flow, reduce cramps, etc. The disadvantages are equivalent to the side effects. These include irregular bleeding, bloating, headaches, among others.

Keywords: contraception, sexual hormones, pregnancy, ovulation

MODELERS OF THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM

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The renin-angiotensin-aldosterone system is a neuroendocrine system, which aims to modulate the hydroelectrolyte balance and regulate blood pressure. This consists of a series of reactions, which, when unregulated, can give rise to various renal and cardiovascular pathologies and arterial hypertension.

The stimuli that activate the RAAS pathway are all related to low blood pressure. Sodium reabsorption does not directly increase low blood pressure, but Na+ retention increases osmolality, which stimulates thirst. Thus, when a person drinks more fluid, the volume of extracellular fluid (LEC) increases, so if the volume of the blood increases, the blood pressure also increases. Angiotensin II is an important hormone, with supplementary effects that lead to increased blood pressure. Angiotensin II receptor antagonists (ARA) have vasodilator action by blocking ANG II.

Once these pressure-boosting effects of ANG II became known, drug companies began looking for drugs that would block it. This research resulted in the development of a new class of antihypertensive drugs, called angiotensin-converting enzyme (ACE) inhibitors. Recently, another class of drugs has been approved, direct renin inhibitors. There are several drugs that act on this system to treat conditions such as hypertension, heart failure, and chronic kidney disease, some examples include: angiotensin-converting enzyme inhibitors, such as enalapril and lisinopril.

Drugs that inhibit the hyperactivity of the renin-angiotensin-aldosterone system are among the most important antihypertensive agents due to their efficacy in controlling blood pressure levels and reducing cardiovascular events.

Keywords: renin-angiotensin-aldosterone system, angiotensin II, blood pressure.

INCRETIN MIMETICS

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Incretin mimetics are a newly developed medication and a fresh approach to managing type 2 diabetes, these medicates simulate the action of incretins, substances originating in the pancreas that regulate glucose levels and increase insulin secretion. They began to be popularly used as a weight loss mechanism, as they cause loss of appetite, with the most common side effects being nausea, vomiting and diarrhea. To address obesity, the utilization of GLP-1 incretin was suggested, which relies on glucose, diminishing appetite while inducing a sense of fullness in patients. Following meals, incretins are discharged in the intestine, aiding insulin production, patients diagnosed with type 2 diabetes experiences a diminished incretin release and reduced insulin responsiveness the administration of high doses of GLP-1 makes it possible to increase insulin in patients, which allows treatment for type 2 diabetes, these high doses help to increase the insulin response and normalize the blood glucose level for a few hours due to the short half-life of GLP-1. Long-lasting GLP-1 receptor agonists have been created, called incretin mimetics, these mimic GLP-1, thus obtaining the same effect as GLP-1 with a prolonged duration.
We therefore conclude that incretins are very beneficial for the treatments discussed, but they must be complemented with physical activity and a controlled diet.

Keywords: Incretins; Insulin; Diabetes;

THE RED BLOOD CELLS COMPATIBILITY TESTS WHY? WHEN AND HOW?

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In science transfusion, ensuring the compatibility of red blood cells (RBC) is paramount for safeguarding the safety of transfusions and prenatal care. While initial focus centred on ABO compatibility tests to prevent haemolytic transfusion reactions, predictive in vitro assays have supplemented these measures over time. Prenatal screening now involves genotyping for RHD, aiding in decisions regarding Rh immune globulin prophylaxis and predicting the risks of haemolytic diseases. However, challenges such as genotype-phenotype discordance must be addressed before the widespread adoption of this approach.

Critical compatibility assessments encompass the direct (TAD) and indirect Coombs Test (TAI), pivotal for interrogating antibodies and ascertaining RBC phenotype, particularly in conditions like autoimmune haemolytic anaemia and haemolytic disease of the newborn. Pre-transfusion evaluation aims at detecting ABO/D incompatibility and clinically significant red blood cells antibodies, requiring precise grouping, compatibility validation, and the selection of appropriate RBC units. Establishing robust identification systems is imperative to avert misidentification errors.

Crossmatch tests are used to validate compatibility between patient serum/plasma and donor RBC units, with the extent contingent upon the reliability of pre-transfusion testing. Molecular analysis, particularly next-generation sequencing (NGS), provides an in-depth genetic analysis for predicting RBC antigens. However, its routine integration hinges on various factors such as cost-effectiveness and validation.

Safeguarding RBC compatibility is fundamental in science transfusion, mitigating the inherent risks associated with transfusions and prenatal care. This necessitates a judicious combination of traditional and molecular testing methods alongside robust identification protocols, ensuring the efficacy and safety of patient care.

Keywords: Compatibility; Red Blood Cells; Transfusions; Pre-natal care; Coombs test.

THE LABORATORY STUDY OF DRUG INDUCED AUTOIMMUNE HEMOLYTIC ANEMIA

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Drug Induced Autoimmune Hemolytic Anemia (DIIHA) is a rare cause of hemolytic anemia. It is often difficult to distinguish from other hemolytic anemias thereby being crucial performing a differential diagnosis, holding accountantable the clinical history and serology of the patient.

Antibiotics such as penicillin and cephalosporin, anti-inflammatory drugs and chemotherapy related drugs can induce DIIHA. Namely, through the autoimmune mechanism, the erythrocytes suffer lyses and it can be lethal for the patient. There are two types of DIIHA: Drug Independent Antibodies and Drug Dependent Antibodies. Although their mechanisms are different, patients present nonspecific symptoms and clinical finds associated with anemia and hemolysis.

The laboratory holds great value in the diagnosis of DIIHA. Using the Direct Antiglobulin Test (DAT), we can detect if there is IgG and/or C3d bound to the erythrocyte's membrane and exclusion of G6PD involvement for hemolytic anemia. Depending on the result there will be different laboratory procedures: Cold agglutinin titer, Donath-Landsteiner Test and study of specific antibodies. Naranjo's Score can also be helpful to the diagnosis.

Treatment is primarily based on stopping drug administration, but in severe DIIHA cases blood transfusion and plasma exchange may be required. Moreover, corticosteroids and immunosuppressants can be helpful, stopping the inflammation and the immune response.

In this review, we will use a clinical case as an example of DIIHA and its laboratory study. The patient is a 25 year old caucasian female who presented clinical finds related to anemia and was on amoxicillin-clavulanate due to a sinus infection.

Keywords: Drug induced immune hemolytic anemia, Hemolytic anemia, Direct Antiglobulin Test, Antibodies, Amoxicillin-Clavulanate.

THE LABORATORY STUDY OF COLD AUTOIMMUNE HEMOLYTIC ANEMIA

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Cold autoimmune hemolytic anemia (cAIHA) is a rare autoimmune disorder characterized by the destruction of red blood cells (RBC) mediated by cold-reactive autoantibodies (IgM-mediated). cAIHA develops more frequently among elderly people, and it prevails in colder climates. cAIHA typically manifests as a primary lymphoproliferative disorder - Cold Agglutinin Disease (CAD) - characterized by marrow B-cell clones producing pathogenic IgM. While less common, secondary cAIHA Cold Agglutinin Syndrome (CAS) may arise from previous malignancy, infection or autoimmune disorders. Approximately 50% of cAIHA cases manifest in association with other immunological conditions.

Immunoglobulin M binds to RBC surface antigens through k light chains promoting agglutination. The classic complement pathway is activated and phagocytosis in the reticuloendothelial system is triggered. IgM-sensitized RBC are correlated to intravascular and extravascular hemolysis.

Patients with cAIHA mainly present anemia-related symptoms, such as dyspnea, fatigue, tachycardia and acrocyanosis, which worsen in lower temperatures. The diagnosis includes an evaluation of markers of hemolysis and Direct Antiglobulin Test (DAT) to confirm autoimmune pathogenesis, which is generally strongly positive for C3d. Bone marrow examination and immunophenotyping are also relevant for the evaluation of IgM antibodies, as well as physical examination to rule out underlying malignancy or infection.

Currently, there is no licensed treatment for cAIHA. Considering that not many clinical trials are carried out, recommendations on diagnostic and therapy are often based on expert opinions and national guidelines. Rituximab is first-line therapy, and the main choice. However, new options now include complement directed treatments, as well as B-cells and plasmatic cells directed treatments.

Keywords: Cold Autoimmune Hemolytic Anemia; IgM Antibodies; Rituximab; Direct Antiglobulin Test; Complement.

THE LABORATORY STUDY OF PERINATAL HEMOLYTIC ANEMIA

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Perinatal Hemolytic Anemia (PHA) is a disease that results from antigenic incompatibility between the blood of the mother and the fetus. This incompatibility may be associated with other systems, however, as the D antigen is highly immunogenic and is found only in red blood cells (RBC), the Rhesus system is the one that causes the most complications in the fetus. Namely, severe anemia due to destruction of RBC, jaundice, kernicterus and systemic tissue problems.

The first immune response is through the production of IgM antibodies, with no risk to the fetus. However, after sensitization of the mother, the class switches to IgG, capable of crossing the placental barrier and destroying the RBC of the fetus. This alloimmunization is stronger each pregnancy.

This can be diagnosed at an early stage, through the mother's blood typing for the AB0 and Rh system, the search for alloantibodies against the alleged father antigens and, if present, the paternal blood group and its phenotype. After that, using PCR, the fetal blood group is determined. Complementary techniques may also be used for the diagnosis.

The most used treatments are phototherapy, intrauterine transfusions and exchange transfusions, and iron administration to stimulate the production of RBC. However, in 1968 appeared the injection with anti-D IgG, a revolutionary method. Used as immunoprophylaxis, administered during pregnancy and postpartum, it reduced the incidence levels of AHP from 1% to 0.1%.

In conclusion, significant advances in transfusion sciences have allowed better outcomes and fewer complications over the past 50 years.

Keywords: Perinatal Hemolytic Anemia; Alloimmunization; Immunoprophylaxis; Anti-D IgG; Exchange Transfusions

THE DONATH LANDSTEINER TEST

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The Donath-Landsteiner (DL) test is a serological test used in the detection of biphasic hemolysin, an IgG autoantibody with specificity for the P antigen that binds to erythrocytes, fixing complement at low temperatures. The complement is activated when there is dissociation of the complex due to an increase in temperature, leading to intravascular hemolysis.

There are three ways to perform this test. One of them is the direct DL, where the patient's blood is collected in two tubes without anticoagulant, one to incubate at 37ºC and the other at 0ºC and later at 37ºC. After centrifugation, the supernatant is observed to check for the occurrence of hemolysis.

Indirect DL, on the other hand, consists of the detection of P antibodies in the patient's serum through several incubation phases and duration, both at 0 and 37 degrees.

We can also resort to indirect DL with modifications, which can be of two phases, a simple indirect antiglobulin test or the enzymatic treatment of erythrocytes. This last one, is more sensitive because it uses reagents such as papain in order to increase the exposure of antigens in the erythrocyte membrane.

The suspicion of a rare presenting form of Autoimmune Hemolytic Anemia, Paroxysmal Cold Hemoglobinuria, leads to the performance of this test. This disease is most common in children, being triggered by a clonal disorder caused by an acquired mutation in the PIGA gene of hematopoietic stem cells.

Keywords: Donath Landsteiner Test; Paroxysmal cold hemoglobinuria; autoimmune hemolytic anemia; autoantibody; complement

THE INVESTIGATION OF NONHEMOLYTIC TRANSFUSION REACTIONS

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Transfusion of blood and blood components is, generally, a safe therapy, widely used in hospital clinical practice and is not exempt from the occurrence of adverse transfusion reactions. Transfusion reactions can be hemolytic or nonhemolytic. Nonhemolytics occur during or after a transfusion and do not involve hemolysis of the donor's blood cells by the recipient's immune system.

These reactions have variants, the most common being the Febrile Nonhemolytic transfusion reaction, which occurs due to cytokines and reactions with antibodies from the Human Leukocyte Antigen System. The others result from hypersensitivity reactions, response to proteins, reactions against platelet antigens or against neutrophils, monocytes, or the endothelium itself.

The general symptomatology is fever, chills, nausea, and hypotension, with other symptoms and signs inherent to each variant.

Treatment is mostly supportive and appropriate to each variant, such as antihistamines in mild allergic reactions and antipyretics in Febrile Nonhemolytic transfusion reactions.

Knowledge and information ensure that health professionals involved in the area correctly comply with standards and procedures, which consequently lead to a reduction in the occurrence of adverse transfusion reactions. On the other hand, monitoring patients in the post-transfusion period is essential to follow-up the patient's response.

The investigation of nonhemolytic transfusion reactions seeks to identify the causes of these adverse reactions, prevent recurrences, improve transfusion processes, and ensure the well-being of patients.

Keywords: Transfusion reaction, nonhemolytic, blood transfusion, febrile nonhemolytic, hemolysis.

FREEZE ELUATE TECHNIQUE FOR DIAGNOSIS OF PERINATAL HEMOLYTIC DISEASE DUE TO ABO INCOMPATIBILITY

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Hemolytic disease of the fetus and newborn (HDFN) is the result of the accelerated destruction of fetal erythrocytes by maternal antibodies. These antibodies are produced by incompatibility between the Rh or AB0 system.

Hemolysis resulting from AB0 incompatibility affects mothers with blood group 0 whose children have blood types A or B. Unlike mothers with blood types A or B, whose natural antibodies are mainly IgM type and therefore don't pass through the placental barrier, group 0 mothers predominantly host natural antibodies of the anti-A or anti-B IgG class. These IgG antibodies can cross through the placental barrier, potentially leading to HDFN in their first child.

Diagnosing this condition involves using the direct antiglobulin test (DAT) from the newborn's cells for the detection of neonatal erythrocytes sensitized with immunoglobulins. However, the erythrocytes of the newborn may not agglutinate with monospecific reagents (such as anti-C3d or anti-IgG), which are employed to identify protein-coated cells, leading to a false negative result. This is primarily due to two factors: the limited presence of antigens A and B on newborn red blood cells and the comparatively low concentration of complement in the serum.

Since DAT doesn't always provide a reliable diagnosis and doesn't determinate the specificity of the bound antibody, the freeze eluate technique is used. This method involves extracting opsonizing antibodies linked to the erythrocyte membrane and their subsequent identification. This test detects the presence of maternal anti-A and anti-B antibodies in newborns, has high sensitivity and a high negative predictive value.

Keywords: Hemolytic disease, ABO incompatibility, Direct antiglobulin test, Freeze Elution

THE LABORATORY STUDY COLD AGGLUTININS

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Cold Agglutinin Disease (CAD) is a rare autoimmune disorder characterized by elevated levels of circulating cold-sensitive antibodies, typically IgM. Frequently, symptoms resemble those of the common cold associated with acrocyanosis leading to skin necrosis. While most cases are IgM-mediated, IgG and IgA cases are less common. Laboratory diagnosis involves assessing the ability of cold agglutinins to agglutinate red blood cells (RBC) at 4°C. Hemolysis in CAD can be intravascular or extravascular and is complement-mediated. The activation of the complement pathway can occur in two steps, one of which is temperature dependent.

The prevalence of CAD varies between cold and warm climates, with notable differences in Norway (20 cases/million) compared to Lombardy, Italy (5 cases/million). Incidence rates also reflect this disparity, with 1.9 versus 0.48 cases/million per year.

The first test is the polyspecific direct antiglobulin test (DAT). A monospecific DAT for C3d should be done if the polyspecific DAT is positive. A positive anti-C3d DAT should be followed by a cold agglutinin titer of 1:64 or more for diagnosis.

Treatment primarily aims at symptom management. Non-drug interventions focus on maintaining warmth, particularly in extremities prone to cold exposure. In cases of chronic anemia, RBC transfusion is utilized, ensuring a temperature above 37ºC throughout the procedure.

Drug therapy options include rituximab alone or in combination with fludarabine, resulting in approximately a 76% increase in treatment response. These interventions aim to alleviate symptoms and improve the quality of life for patients with CAD.

Keywords: Cold agglutinins, diagnostic challenges, therapeutic implications

THE LABORATORY STUDY OF HEMOLYTIC TRANSFUSION REACTIONS

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Hemolytic Transfusion Reactions (HTR) occur when the recipient's immune system reacts to the transfused blood, resulting in adverse effects. These reactions are immune-mediated and can be either acute or delayed. HTRs are caused by an incompatibility between the donor and receiver. Acute hemolytic transfusion reactions (AHTR) are usually caused by AB0 incompatibility but can also be caused by non-AB0 antigens. This acute reaction can lead to an intra or extra-vascular hemolysis. Delayed transfusion reactions can occur up to 4 weeks after the transfusion and are more common in cases of D, Jk, Fy incompatibility, etc. The most common signs and symptoms include fever, back pain, pain at the site of intravenous infusion, hemoglobinemia, hemoglobinuria, acute kidney injury, diffuse intravascular coagulation, and death (exceeding 50%).

The laboratory has a major responsibility in correctly identifying the blood type of a given patient, which is one of the major sources of transfusion reaction events. Through advanced immunohemotherapy techniques, the laboratory must check for antigens in the recipient's erythrocytes and plasma, as well as alloantibodies, the individual's entire phenotype, and, extremely importantly, review the patient's clinical history. Therefore, the laboratory study of these reactions is crucial in prevention, diagnosis, and treatment. Healthcare professionals must follow strict regulations, however, even with good laboratory practices, the risk of hemolytic reactions is never zero, so the professional must always be aware and vigilant of clinical signs since a rapid diagnosis is crucial to the patient's survival.

Keywords: Transfused blood, adverse transfusion effects, intra or extra-vascular hemolysis, immunohemotherapy techniques, hemolytic transfusion reaction

THE LABORATORY STUDY OF WARM AUTOIMMUNE HEMOLYTIC ANEMIA

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The warm autoimmune hemolytic anemia (wAIHA) is a rare condition where the red blood cells (RBC) are destroyed by self-reactive immunoglobulin G (IgG), with or without complement activation. RBC coated with warm reactive IgG are bound by spleen macrophages, which carry Fcγ for receptors for the IgG heavy chain, and they are either phagocytosed or have part of their membrane removed, and in which case form microspherocytes subject to destruction during their next passage through the spleen. The main symptom is jaundice, but we can also experience symptoms associated with anemia and hemolysis.

Primary wAIHA, happens when the underlying disease has not been demonstrated, whereas the secondary occurs when associated with other diseases. The diagnosis for the primary wAIHA relies on a positive direct antiglobulin test (DAT) and eluate. Conversely in secondary cases, the DAT might show a negative result, so there are other methods that can lead to the detection of these disease such as reticulocyte count, hyperbilirubinemia, increased lactate dehydrogenase (LDH) levels, the presence of spherocytes and B-cells lymphoproliferative diseases, also the bone marrow exam can be useful to assess erythropoiesis.

Initial treatment approach involves administering corticosteroids, often supplemented with rituximab to enhance therapeutic efficacy. Splenectomy is a last therapeutic option. wAIHA is the most common type of AIHA, accounting for ⅔ of cases and average age of presentation in adults is 53 years old, 60% of whom are women. Given these, the availability of a comprehensive array of laboratory techniques for accurate diagnosis is paramount.

Keywords: Warm autoimmune hemolytic anemia, immunoglobulin G, direct antiglobulin test, spherocytes, complement

WATER QUALITY, STRUCTURAL AND OPERATIONAL CONDITIONS OF POOLS, WATER PARKS, AND BEACHES: USERS' PERSPECTIVE

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The coastal and river beaches, water parks, and pools are areas that offer a wide variety of activities for their bathers. These activities can be associated with sports, social events, educational, socio-cultural, and even military activities. These spaces are subject to assessments of water quality, structural conditions, and operation, aiming to prevent health risks for users.
This study was conducted in order to obtain information on the perspective of users of these spaces and the information they possess regarding the topic addressed.
For the realization of this study, a questionnaire was administered regarding users' perspectives on the quality of water, structural conditions, and operation of open-air pools, water parks, and coastal and river beaches. Also framed in the study was a theoretical review based on official documents and scientific articles in order to analyze the results.
After analyzing the results, it was found that, regarding users' opinions on water quality, they reported it as "Reasonable" in open-air pools (41.51%), water parks (33.96%), and river beaches (35.85%), and "Good" in coastal beaches (37.74%). Finally, regarding good practices for maintaining cleanliness of these spaces, 35 people (66%) responded "Using containers and correctly separating waste", 25 people (47.2%) responded "Putting diapers on children up to 2 years old, at least.", 41 people (77.4%) responded "Not throwing cigarette butts on the sand", 24 people (45.3%) responded "Not entering the water with infected wounds", and 7 people (13.2%) deny that any of the previous practices bring benefits to the maintenance of cleanliness of these spaces, revealing that there is still a lot of misinformation regarding this topic.
Therefore, it can be concluded that there are not enough environmental education campaigns to make people aware of the rules of operation, structural conditions, and water quality of these aquatic spaces, starting with sensitizations regarding good practices, and so, users may feel safe and well-informed about all the services provided in these spaces.

Keywords: Water quality; good practices; aquatic spaces; environmental education;

RIVER BEACHES VS SEA BEACHES

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Maritime beaches are situated along the coastline, bathed by the ocean or sea, while river beaches are located on the banks of rivers or lakes.

The water quality at maritime and river beaches is often assessed based on parameters indicating the presence of contamination, which can pose public health issues.

The aim of this work, entitled "River Beaches vs. Maritime Beaches," was to explore the significance of maritime and river beaches for local communities in terms of fishing, tourism, recreation, economy, and quality of life, and to assess public knowledge. To achieve this goal, we administered a questionnaire, from which we obtained a sample of 60 responses.

The most relevant results indicate that 97% of respondents agree that these beaches are a good source of tourism, 78% believe there are differences in maintenance costs between river beaches, and finally, 78% consider the beaches they frequent to have good sand quality.

In this study, we investigated the particularities that distinguish coastal beaches from river beaches. Furthermore, it is important to highlight that these areas play a crucial role in replenishing underground reservoirs and maintaining the water cycle. Water quality and the conservation of river ecosystems are essential aspects for the preservation of these environments.

Keywords: Water Quality, Bathing Waters, Tourism

SOCIAL AND ENVIRONMENTAL IMPACT OF WWTPS

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The positive effects inherent in the operation of wastewater treatment plants are evident and undeniable, because they allow the improvement of water quality that is rejected into the receiving environment, this process has environmental and public health benefits. However, the construction and operation of these infrastructures, as well as others associated with them, generate impacts on the environment from a biophysical, economic, and social perspective, which must be considered from the initial phase of project conception.

The regulatory entity for water and waste services, aims to protect user interests, safeguard the economic viability of managing entities, and protect environmental aspects.

The article addressed the assessment of the social and environmental impact of Wastewater Treatment Plants, as their operation can generate significant impacts on the environment and the community.

For the realization of our article, we analyzed scientific articles on the topic of the work and subsequently, our objective was based on collecting population data, based on a brief questionnaire, in which we obtained around 44 responses.

According to the data observed, the majority of people questioned correctly enumerated the positive and negative Social and Environmental Impacts of treatment plants, which showed that the population has knowledge on the subject, especially regarding their objective, as 81.8% of the population correctly responded that it would be the processing and purification of effluents of domestic or industrial origin.

In short, we considered that in addition to obtaining data on knowledge, we also fostered interest in the topic and promoted environmental health literacy.

Keywords: Quality; Public Health; Environment; Effects

LEVEL OF KNOWLEDGE AND GOOD PRACTICES IN THE USE OF RIVER BEACHES

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Water is essential to life, ensuring the existence of human beings, biodiversity, and ecosystem balance. It also plays a crucial role in the quality of life of populations, as it is necessary for various economic activities carried out by humans.

The main objectives of choosing this theme were to introduce the concept of river beaches and the best practices in their use, understanding the population's level of knowledge regarding the topic. It also aims to inform the population about the consequences of the absence of good practices on the environment and consequently on public health. We conducted a questionnaire to obtain data to achieve these objectives, with the participation of 85 people.

According to the observed data, 97.6% of the population is aware of what a river beach is, which leads them to follow good practices, with 98.9% claiming to do so. One practice that should be used is the assessment of water quality; therefore, 96.5% of the population under study states that it is important to assess its quality when choosing a beach to visit. Regarding users' perception of contaminants present in river beaches, 89.4% of the population correctly responded "Regularly perform water quality tests," 9.4% responded "Do not enter the water with products such as sunscreen, as the water is fresh," and 1.2% responded "Leave waste near the riverbanks." Regarding the good practices to be adopted at beaches, only 1.2% of the population incorrectly responded "Allow the use of chemical products such as fertilizers in the surrounding areas." A significant portion of the population is aware of contaminants present in river beaches; however, 21.2% responded "Nuclear waste," which is incorrect, and only 39.9% responded "Heavy metals."

In summary, the management and quality of river beaches are crucial for tourism development, as well as for public health and environmental preservation. Water quality is essential to ensure the safety and health of people who frequent river beaches.

Keywords: river beach, practices, management, quality, water resources

LEVEL OF KNOWLEDGE ABOUT THE IMPLICATIONS OF CYANOBACTERIA ON HEALTH AND THE ENVIRONMENT

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Cyanobacteria, common microorganisms in aquatic environments, can proliferate rapidly under favorable conditions, posing a risk to public health and the ecosystem due to the production of harmful toxins. Contact with water contaminated by these bacteria can cause skin and eye irritations, gastrointestinal problems and serious poisoning, in addition to harming water quality and biodiversity.

The aim of this study was to evaluate the population's knowledge about the risks of cyanobacteria. Through a questionnaire, we seek to identify knowledge gaps and promote environmental awareness, highlighting the dangers of cyanobacterial contamination and encouraging prevention practices.

We hope that this project will contribute to protecting public health and the balance of aquatic ecosystems, stimulating behavioral changes and attitudes in favor of environmental conservation.

In a group of 36 individuals, it was found that 48% were already aware of cyanobacteria, although only 15% understood the factors that contribute to their growth.Despite this, 57% acknowledged the harmful potential of cyanobacteria for human health.

We can conclude that 80% of the participants think that the need for monitoring and control of cyanobacteria in water bodies is important, as well as the importance of greater public education on the subject. 63% were willing to take preventive measures when visiting areas with alerts for the presence of these microorganisms.

According to these results, we can conclude that there is an urgency to invest in environmental education and continuous research to address the challenges related to cyanobacteria and protect public health.

Keywords: cyanobacteria, health, environment

THE IMPORTANCE OF WATER ANALYSIS AND MAINTENANCE IN INDOOR SWIMMING POOLS

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The aim of this work was to highlight the importance of analyzing and maintaining the water in indoor swimming pools. We intend to briefly address issues such as diseases and public health problems that may be associated with the lack or incorrect analysis/maintenance of indoor swimming pool water.

The methodology used in the study was the analysis of bibliographic documents, scientific articles and the application of a questionnaire to the population on the subject under study. The purpose of the questionnaire was to estimate the general population's knowledge of the subject in question, always aiming to raise awareness of the problems involved in a simple and succinct manner.

With regard to the essential measures to guarantee the safety and quality of water in indoor swimming pools, the majority of respondents considered "Regular monitoring of pH levels and water chlorine" and "Efficient water filtration to remove impurities and contaminants" to be the most important.

We conclude that the population is not totally uninformed about the subject under study. However, some aspects need to be improved and for this the population needs to be more aware. Combating this lack of knowledge requires a continuous and coordinated effort from various parties, including the competent authorities, government institutions and the community itself, so that the population can change its behavior.

Keywords: water, indoor swimming pools, analysis, maintenance, behaviors

PUBLIC SWIMMING POOL WATER QUALITY AND ITS EFFECTS ON PUBLIC HEALTH

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The increasing use of public swimming pools is a healthy practice, but it can have risks for human health, despite the microbiological and chemical quality of the water being regularly monitored and its disinfection being mandatory.

The objective of this study was to evaluate the level of good practices adopted in the use of swimming pools.

A literature review was conducted on the subject and a questionnaire was applied to the general population.

It was found that the majority (85.4%) uses the swimming pool for leisure activities, while a smaller portion uses it for sports (10.4%). Users (87.5%) consider that it is "very important" to adopt good practice measures in the use of swimming pools, with the majority saying that they "always" wear shorts or a bathing suit, in good hygienic conditions and take a shower before entering the pool.

The elimination of microbiological and chemical risks associated with the use of swimming pools should be a major element in the management and operation of public swimming pools. In indoor swimming pools, in particular, users are the main source of contamination.

Therefore, it is of the utmost importance that the quality of the water in the swimming pools does not jeopardize the health of bathers; hence, it is necessary to keep it in perfect conditions of hygiene and cleanliness. This is only achieved by implementing two fundamental requirements: correct and regular chemical disinfection and proper physical treatment.

Keywords: Disinfection, Knowledge, Risks, Contamination

LEVEL OF KNOWLEDGE AND BEST PRACTICES IN THE USE OF POOLS (INDOOR AND OUTDOOR)

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The management of best practices in swimming pools is vital not only to ensure an enjoyable experience for users but also to preserve environmental health. Water quality is a crucial point, with the rigorous implementation of treatment procedures, such as proper disinfection, essential to prevent diseases and protect the surrounding ecosystem. Responsible waste management in swimming pools is crucial to avoid negative impacts on local ecosystems. Users play a vital role in maintaining a healthy environment. Practices such as personal hygiene, refraining from urinating in the water, and avoiding excessive use of cosmetics are essential. Respecting pool rules, such as not smoking or eating inside it, contributes to safety and environmental preservation. Participating in education programs on water safety promotes collective awareness and environmental responsibility. Monitoring health and avoiding entering the pool when ill is vital to prevent disease spread. As for users' habits, only 8.3% go to the bathroom before entering the pool very frequently, while 25% never do. Regarding the use of caps in indoor pools, the majority (50%) never use them. As for the removal of cream or sunscreen before entering the pool, only 10% do so very frequently, while 30% do not remove it. These data highlight the need to reinforce awareness and adherence to hygiene and safety practices among pool users. Collaboration among managers, users, and communities is essential to create and maintain aquatic spaces that benefit everyone, promoting safety, hygiene, and sustainability. By incorporating these best practices into everyday life, users actively collaborate to maintain a safe, hygienic, and sustainable aquatic environment, while also promoting their own health.

Keywords: Swimming pool management; Water quality; Treatment procedures; Responsible waste management; Education programs.

ASSESSMENT OF *LEGIONELLA* KNOWLEDGE LEVELS AND BEST PRACTICES AMONG THE GENERAL POPULATION

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The assessment of Legionella knowledge levels and adherence to best practices within the general population is crucial for understanding public awareness and implementing effective prevention strategies against Legionnaires' disease.

Legionella is a bacterium commonly found in water systems, posing a risk when aerosolized and inhaled. This study aims to evaluate the public's understanding of *Legionella*, its associated risks, and preventive measures.

Surveys and interviews will be conducted to gauge knowledge regarding *Legionella* transmission routes, high-risk environments, symptoms of Legionnaires' disease, and preventive actions such as regular maintenance of water systems and proper disinfection procedures.

Analyzing the data obtained will provide insights into areas of misconception or insufficient awareness, guiding the development of educational campaigns and policies to enhance public health preparedness against *Legionella* outbreaks.

Ultimately, improving the general population's knowledge and adherence to best practices regarding *Legionella* will contribute to reducing the incidence of Legionnaires' disease and safeguarding public health.

Keywords: *Legionella*, practices, awareness, population

USERS' PERCEPTION OF WATER QUALITY, STRUCTURAL AND OPERATING CONDITIONS OF SEA BEACHES

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A beach can be defined as the accumulation of unconsolidated sediments, formed by the joint action of waves, currents and tides. Furthermore, it is also a land/sea interface space adapted for bathing use, equipped with access and parking and a set of support services.

Bathing waters are considered to be surface waters, where a large number of bathers are expected, and where bathing has not been permanently prohibited or discouraged.

This study's main objective was to evaluate users' perception of water quality, structural and operating conditions of sea beaches and also to publicize and raise awareness among the population about the adoption of good practices when using them. Therefore, we chose to analyze scientific articles and prepare a questionnaire to obtain data in order to achieve the objectives, in which 40 people participated.

According to the results obtained, 70% of respondents say that the beaches they usually visit have good water quality, with a satisfaction rate of 57.7% regarding the quality of beaches in general. Furthermore, 75% of the population affirmed the non-existence of the “Accessible Beach - Beach for all!” on the beaches you visit regularly.

In short, the quality of sea beaches is crucial, not only for tourism and leisure, but also for public health, thus highlighting the importance of collaboration between local authorities and the wider community, in order to promote a more sustainable coastal environment.

Keywords: Quality, Blue Flag, Infrastructures, Beach, Environment

GASTRULATION

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Gastrulation is a critical process of embryogenesis that occurs during the third week of human development. Gastrulation begins with the formation of the primitive streak on the surface of the epiblast, around day 14. By the beginning of the third week, the conceptus is a bilaminar embryonic disc, formed by the hypoblast and epiblast, which has begun to undergo the process of gastrulation, in which it becomes a trilaminar disc, followed by the development of the various tissues and organs of the embryo.

This trilaminar disc is organized to form the three primary germ layers: the endoderm, mesoderm and ectoderm. The endoderm gives rise to the epithelial linings of the respiratory and gastrointestinal tracts. The mesoderm gives rise to the visceral smooth muscle layers and all skeletal muscles and is the source of blood cells, bone marrow and the lining of blood vessels. The ectoderm gives rise to the central and peripheral nervous system, eyes, inner ears, and many connective tissues of the head. Throughout the gastrulation stage, the embryo is called a gastrula. The aim of this paper is to present gastrulation as the central stage of embryonic development, where the embryonic leaflets responsible for giving rise to the embryo's organs and tissues are formed. As well as preparing the embryo for organ formation, gastrulation provides a mechanism for developing a multi-level body plan that defines the formation of the anatomical axis.

Keywords: Gastrulation, Embryonic disc, Conceptus, Primitive streak, Germ layers

CRYOPRESERVATION OF GAMETES AND EMBRYOS

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Human fertility (recurrently in women) decreases from age 35. And since many couples currently postpone their children's birth,collecting and cryopreserving gametes for later fertilization is advantageous. This process consists of freezing gametes (sperm and/or oocytes) or even embryos at low temperatures. Cryopreservation is done in basically 3 steps: First, it is necessary to collect gametes.Where cryoprotectants(antifreeze compounds)are later added to protect the cells from possible damage (like the formation of ice crystals); Therefore, the cells are packed in liquid nitrogen at -196ºC; Finally, the storage of gametes or embryos remaining in nitrogen, which can be stored for a long time. Separating the cryopreservation of female and male gametes, the male gametes are the most common because they are simpler to collect, while the female is a more complex process, and the oocytes are not only more complex in their collection, but also more sensitive to high temperatures. When sperm is collected, it is assessed for viability and then stored in sperm banks and frozen. The collection of female gametes is done by removing them from the ovaries to be later treated and frozen. As for thawing, this happens in warm water at 36ºC, where the extracellular ice melts and penetrates the cell membrane rehydrating the cell. But there are risks, such as losing 50% of the sperm motility (cryopreservation doesn't always preserve all the material collected); the eggs undergo changes (e.g., loss of plasma membrane integrity or changes in the zona pellucida becoming thicker); and embryos may lose some cells (but survival rates are high, from 90 to 95%). There are also advantages, however, such as the possibility of pregnancy in women who do not have ovaries, who have premature menopause or who have undergone cancer treatment, and also preservation of genetic material. In conclusion, cryopreservation is a very reliable and fast method, allowing you to preserve gametes for a long period, which is advantageous for women who want to postpone their motherhood or for treatments that cause drops in their fertility.

Keywords: Key words: cryopreservation, gametes, embryos, nitrogen, temperature.

NERVOUS TISSUE

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Nervous tissue is formed through the neural plate, which begins to differentiate under the influence of the notochord nearby and the paraxial mesoderm during the third week, in a process called neurulation. During neurulation, the neural folds merge to form the neural tube, which will develop into the Central Nervous System. Finally, the neural crest, also originated from the neural plate, gives rise to most of the cells of the peripheral and autonomic nervous system.

Neurons and glial cells are constituents of this tissue, working together to form the functional structure of the nervous system, promoting the transition of nerve impulses through synapses. These cells are connected to each other, through the dendrites of the pre-synaptic neuron with the axon extensions of the post-synaptic neuron. Nerve cells have a very peculiar shape, with the cell body having a star-like appearance, containing the nucleus and a long filament that transmits the nerve impulse, called axon, finally the nerve endings, the dendrites.

Furthermore, nervous tissue is organized into different regions and structures, including the brain, spinal cord, and peripheral nerves. Each region performs specific functions in the processing and transmission of information within the organism. This structural and functional complexity allows the nervous system to perform a wide variety of functions, from motor control to cognitive and emotional not forgetting hearing and balance.

The objective of this work is the study of the development of nervous tissue, which is important in embryo development, being responsible for the formation and functioning of the nervous system.

Keywords: Nervous tissue, Embryo, Neurons, Glial cells.

Discipline: Embryology and Histology

Professor: Célia A. Gomes

Degree: Audiology

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Edition 21/2024

GAMETOGENESIS

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Gametogenesis is the process of gamete formation, called spermatogenesis in men and oogenesis in women, forming sperm and oocytes respectively. While men produce from adolescence until the rest of their adult life, women only do that until they are around 50-55 years old. One similarity is that in both we observe the presence of two cell division processes: meiosis and mitosis. Mitosis guarantees an increase in the number of cells, while meiosis guarantees a reduction in the genetic material of the gamete. Thus, in meiosis, haploid cells, with 23 chromosomes, are produced. The reduction of genetic material is important so that, at the time of fertilization, the number of chromosomes of the human species returns 46 chromosomes .

Oogenesis, it begins during uterine life and leads to the formation of the mature oocyte, is the process by which, through mitosis, only one viable gamete is formed while the others 3 cells are degenerated. This process only finalised when occurs fertilization where the fusion of the genetic material of the egg and sperm produces the zygote.

Spermatogenesis occurs in the testicles, more specifically in the seminiferous tubes, where diploid cells multiply through mitosis. Each diploid cell produces two cells with the same number of chromosomes. During the maturation phase, the first meiosis occurs and spermatocytes I give rise to two haploid cells. The spermatogenesis process ends with spermiogenesis, also called the differentiation period and is where the transformation of spermatids into sperms occurs. In spermatogenesis, four sperm are produced per cell.

The aim of this work is to increase our comprehension of the formation of gametes in humans.

Keywords: gamete, chromosomes, oogenesis, spermatogenesis, spermiogenesis

MUSCLE TISSUE

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Muscle tissue is a fundamental component of the human body, playing a crucial role in various physiological functions such as movement and mantaining posture of the body. Constituted by specialized cells called muscle fibers, muscle tissue is categorized into three main types: skeletal, smooth, and cardiac. Skeletal muscles are composed of long multinucleated myocytes, responsible for voluntary (and involuntary) movements, while smooth muscles found in walls of internal organs, play part in involuntary control actions such as those in the digestive and respiratory systems. Cardiac muscles form the muscular wall of the heart and ensure its rhythmic contractions. The complex structure of muscle tissue involves sarcomeres, the basic contractile units, and the interaction between actin and myosin filaments. Understanding the properties and functions of muscle tissue is essential for comprehending human movement, maintaining overall health, and addressing various medical conditions related to muscle dysfunction. Muscular muscle provides mechanical force needed for body movement, mantaining organ functio and supporting physiological processes.

In addition to this, it's essential to highlight the significance of sarcomeres in muscle function. Sarcomeres are the fundamental contractile units within muscle fibers, responsible for generating the force required for muscle contraction. These highly organized structures consist of overlapping actin and myosin filaments, whose interactions during contraction and relaxation drive muscle movement.

Making this project helped us deepen the various types of muscular tissue as well as understand their functions.

Keywords: Muscle Tissue, Sarcomeres, Physiological Function

EXPLORING THE WORLD OF BONE TISSUE: STRUCTURE, FUNCTION, AND CLINICAL IMPLICATIONS

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Bone tissue is essential for the support, protection, and metabolic regulation of the human body. It is composed of cells such as osteoblasts, osteocytes and osteoclasts, and a mineralized matrix, which provides the strength and rigidity necessary for support. The bone matrix, composed of collagen fibers and hydroxyapatite, is mineralized to increase stiffness. Its hierarchical organization, including osteons or lamellae, gives it resistance to mechanical forces. Bone remodeling, regulated by hormones such as parathyroid hormone (PTH) and vitamin D, maintains mineral homeostasis. Bone formation occurs via intramembranous and endochondral ossification, coordinated by several growth factors. During fetal development, intramembranous ossification forms the skull, while endochondral ossification gives rise to long, articular bones, including the epiphyseal plate. There are several pathologies that affect bone health such as osteoporosis, osteoarthritis and osteogenesis imperfecta. Much of the ongoing research targets bone regeneration therapies, advances in biomaterials for orthopaedic implants, and tissue engineering for bone reconstruction, promoting better patient outcomes. Understanding and intervening in this tissue is crucial to preventing and treating bone disease, continuing to improve our understanding and intervention in this vital system.

Keywords: Bone tissue Cell types Matrix composition Remodeling regulation Bone formation

IMPLANTATION

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Embryo implantation consists of the fertilized egg attaching itself to the lining of the uterus. This region is intensely vascularized as it is made up of a large number of small capillaries and is responsible for supplying the oxygen and nutrients needed during implantation of the egg there. This process takes place between 6 and 10 days after fertilization, when a sperm meets a viable egg, both in natural pregnancy and in assisted reproduction. After fertilization, the fertilized egg migrates towards the the uterus, where it implants itself, starting the growth of the embryo.

The implantation of the embryo is extremely important because the future of the pregnancy depends on proper implantation, as nutrient reserves are being depleted. From then on, the hormones and nutrients necessary for the development of the embryo and its appendages will be released more effectively.

Implantation of the zygote takes place in the endometrium, the tissue that lines the uterus as mentioned above. After implantation, the interaction between the embryo and the endometrium is responsible for the release of the hormone (HCG), which, when detected in the blood or urine, signals the start of pregnancy. Therefore, the woman's body must develop favorable conditions to ensure the proper implantation of the new being. Once the embryo is implanted, early signs may appear, such as light bleeding and mild cramps due to the implantation of the embryo in the uterine wall and the attachment of the fertilized egg to the uterus.

Objectives: To understand how and when the implantation process takes place and what effects it has on the day-to-day life of a pregnant woman.

Keywords: Hormone, pregnancy, woman, embryo, fertilization

INFLUENCE OF THE TECHNOLOGICAL PROCESS ON THE NUTRITIONAL VALUE OF CANNED SARDINES

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Introduction: Sardines are vital to Portugal's economy, constituting 40% of marine fish consumption and playing a crucial role in the canning industry, which processes nearly half of the country's sardine catch. Canned sardines come in various forms, including tomato sauce, olive oil, vegetable oil, tomato sauce with piri-piri, and natural.
Objectives: Understanding how the processing of sardines from the moment they are caught until the canning affects their nutritional value and organoleptic characteristics.
Methods: The nutritional values of different canned sardines from three different companies (Minerva, Ramirez, and Bom Petisco) were observed, as well as those of three white label brands and natural sardines. In addition, the three companies were contacted with the objective of explaining to us how the canned sardine processing was done.
Results: Canning is a preservation method involving food sealed in a container rendered commercially sterile through heat and pH. The process includes fishing, selection, cleaning, cooking, bone removal, packaging, adding sauces or oils, sealing, sterilization, cooling, and labeling. Cooking reduces water-soluble vitamins but enhances protein digestibility. Sauces or oils increase caloric, fat, and omega-3 content. Storage may cause minor nutritional losses due to oxidation of air-sensitive nutrients like fat-soluble vitamins and unsaturated fatty acids.
Conclusion: The methods used in canning sardines will alter their nutritional and organoleptic characteristics. Cooking leads to vitamin loss, the addition of sauces alters the caloric value and macronutrients, and storage can cause some nutritional losses, mainly due to oxidation.

Keywords: “sardine"; "can"; "processing"; "nutritional changes"; "nutrients”

SMOKED SALMON, IS IT A GOOD OPTION?

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Salmon is a fish that forms part of many European diets. Per capita consumption of salmon in the EU was more than 2 kg (per person) in 2014. Smoked salmon is a highly sought-after and consumed product due to its practicality and association with healthy lifestyles.

The aim is to analyze the technological process to which smoked salmon is subjected and the changes in the nutritional values of salmon before and after the smoking process.

The scientific research was conducted in different scientific databases. 274 articles were obtained, of which nine were selected for reading and 4 were used concretely.

The technological process of smoked salmon involves several crucial steps to prolong the preservation of the product, reducing humidity and slowing down the processes of bacteriological and enzymatic deterioration, with an impact on the nutritional value of the final product. After the smoking process, there was a reduction in the energy value, as well as in the lipid and carbohydrate values per 100g. The protein value increased slightly, while the salt levels increased considerably and it remains, like traditional salmon, an excellent source of Omega 3.

During the technological process that smoked salmon is subject to, dehydration occurs, resulting in a greater concentration of nutrients. Natural salmon is still an excellent option, but smoked salmon can be a suitable and nutritious choice when incorporated into a healthy diet in a balanced way.

Keywords: Technological process; Natural salmon; Smoked salmon; Nutritional impact

CULTIVATED MEAT: PROCESS, POTENTIAL AND THREATS

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The increase in the world's population and the consequent increase in meat consumption, as well as growing concerns about animal welfare and environmental impacts, have led to the search for new approaches to food production. Cultivated meat is emerging as a potential viable option to answer those challenges. To understand the overall production system of in vitro meat, and potential benefits and barriers of production and access to the global market. Research was carried out in the PubMed database in between February and March 2024. 11 articles published between 2015 and 2023, whose title and/or abstract specified the process of cultivated meat production and challenges and benefits of its introduction in the food chain were selected. In vitro meat production can be obtained through several processes, the most accepted involves culturing stem cells outside the animal from which the cells derive. An extraction must be carried and transferred into a suitable medium containing several components required to the growth and differentiation into mature muscle cells. Consumer rejection, neophobia, price and labeling are viewed as possible obstacles to consumption of cultivated meat. On the other hand, environmental impact compared to traditional meat, ethical aspects related to livestock farming, animal-borne diseases and excessive use of antibiotics are perceived as advantages. Cultivated meat could alleviate several concerns. However, these challenges still need to be addressed to fully realize its potential. These challenges include the production process, media optimization, sensory properties, and price.

Keywords: cultivated meat, cultivate meat production, cultivated meat profile

FROM THE FIELD TO THE SHELF: THE INFLUENCE OF THE TECHNOLOGICAL PROCESS ON SOY DRINKS

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Introduction: There's been a growing consumption of plant based products, namely soy drinks, as an alternative to cow's milk, that can be produced traditionally or with an alternative method. Nutritional and organoleptic differences are observed in different soy drinks commercialized in Portugal.

Aim: Understand technological process of soy drinks and its impact on nutritional composition and organoleptic characteristics.

Methods: A search was carried out on Scopus and Pubmed using the keywords "Soy mik", "Soy beverage", "Industrial production" and "Tecnologic Process". Additionally, a market nutritional analysis was performed.

Results: Traditionally, soy drinks are prepared using a simple process that involves soaking soybeans, wet grinding them, boiling the mixture, and then filtering it to obtain the soy drink.

The processing of the soy drink gives it some specificity at a sensorial level, such as an unpleasant flavor and a darker color. However, it also offers the advantage of eliminating anti-nutritional factors. From a nutritional point of view, there's a greater yield of protein and fat if soybeans are soaked in water with sodium bicarbonate, an alternative step to the traditional process. Information related to production process was not observed in label of soy drinks commercialized in Portugal.

Conclusion: Since there are several technological processes on the market for the production of soy drinks, and these influence the nutritional composition and organoleptic perception of the product, it would be important to mention on the label the type of processing it has undergone and to carry out further studies on this subject.

Keywords: "Soy mik", "Soy beverage", "Industrial production", "Tecnologic Process"

OLIVE OIL: TECHNOLOGICAL PROCESS AND NUTRITIONAL PARAMETERS

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Olive oil, the main product derived from olives, has shown high growth in the recent years, associated with several factors, among which stands out the modernization of olive grove and industrial processes, as well as its organoleptic characteristics and its health benefits.

This work aims to analyze and compare the technological and modernized process of olive oil production and its influence on nutritional parameters.

A search was conducted through the databases Pubmed, Google Scholar, together with the HACCP of Lagar Azeite do Cobral. The following keywords were used: “olive oil”, “traditional olive oil”, “modernized olive oil”, “nutritional parameters”. 21 articles were obtained from which were subsequently analyzed to identify repeated articles that are not in accordance with the objective of the study, and 16 articles were selected to be analyzed and to extract theirs results.

The traditional olive oil extraction process involves systems, materials and processes modernized over time. The quality of the different olive oil categories depends on the process, from planting the olive grove to packaging the olive oil, interfering with nutritional parameters such as acidity, peroxide index, and organoleptic characteristics.

The modernized process came not only to correct steps of the traditional olive oil process that had lower quality and safety, but also to ensure good nutritional parameters, which are indispensable for the health of the population.

Keywords: “olive oil”; “traditional olive oil”; “modernized olive oil”; “nutritional parameters”.

RED BEANS, PROCESSING BENEFITS

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Introduction: Beans are nutritionally rich, a source of protein, vitamins, minerals, antioxidants and phytochemicals, essential for preventing the development of chronic non-communicable diseases.

Objective: To analyze the impact of industrial processing of red beans from dry to canned, from different brands comparing them nutritionally.

Methods: The research was conducted in a mixed model, using the Google Scholar platform, where 17,000 articles from the last 10 years were found, with the keywords: “processed canned beans”, “bean processing” and “red beans”. 10 articles were selected by title and 4 used in full. Market research was carried out, 12 brands (9 from distributors) were selected, compared in dry and canned forms, and nutritional comparison, by calculating the average nutritional composition. The BBC carbon footprint calculation was also used.

Results and discussion: After comparing the nutritional values between dry and cooked beans, it is clear that processing does not have a major nutritional impact on the product, and does not affect its quality. The Bonduelle brand has highest protein (8.29g) and fiber (8.5g) content, lowest salt content (0.5g), and no saturated lipids. Contains the additive E509, which gives firmness to the beans, decreasing the need to add salt. It is the most expensive brand.

Conclusion: The processing of red beans is essential for ingestion, because they contain phytohemagglutinin, a toxic lectin, when raw or undercooked. When canned, it is a convenient food, more easily prepared than dry, making it a good option for increasing consumption of legumes. It is a sustainable protein alternative and its consumption should be encouraged.

Keywords: processed canned beans, bean processing, red beans, sustainability

Discipline: Food Technology

Professor: João Lima

Degree: Dietetics and Nutrition

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OSMOTIC DEHYDRATION: WATER ACTIVITY ON THE DEHYDRATED PEAR

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Introduction: Fruits are important and natural sources of dietary fiber, minerals, vitamins (A, B) and especially vitamin C in high concentrations. The growing demand for more natural and/or healthy products requires the improvement of different food preservation techniques. Osmotic dehydration is a non-thermal pre-treatment process that involves immersing food in osmotic agents, in which almost all of the water content is removed, leading to an increase in the shelf life of foods and the preservation of several of their properties.

Objective: This study aimed to evaluate the effect of osmotic dehydration on the water activity of pear.

Methods: For this article, a literature review was conducted in march 2024, through the database of Google Scholar and Science Direct. 34 articles were found from the last ten years. After reading the abstract and methodology, 15 articles were selected for full reading and analysis.

Results and discussion: The results indicated that the effects of osmotic dehydration and fructose concentrations did not have a notable impact on antioxidant properties, with polyphenol and ascorbic acid contents remaining almost constant. It is a low-temperature water removal process, so the loss of colour and flavour is minimal. Since the pieces of fruit are surrounded by solutes, enzymatic and oxidative browning is avoided, making it possible to maintain a good colour with little or no use of sulphur dioxide.

Conclusion: It is concluded that osmotic dehydration is an effective way of lowering the water activity of pear slices thus have an extended shelf life even without refrigeration.

Keywords: "Food Technology", "Osmotic dehydration", "Dehydrated pear”

YOGURT PRODUCTION AND PROCESSING

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Introduction: Yogurt is a dairy product fermented by bacteria, widely consumed in today's dietary pattern with potentially beneficial characteristics for health. The technological process affects the organoleptic and nutritional characteristics of the product.
Objective: To analyze the influence of the manufacturing process on the organoleptic and nutritional characteristics of yogurt.
Methodology: In February and March 2024, a literature review was conducted, using the PubMed, Scopus, ScienceDirect and Google Scholar databases in the last 10 years, through the expression “yogurt production”
Results: The manufacture of yogurt includes processes such as standardization of the fat and protein content of the milk, homogenization, heat treatment, incubation and fermentation, cooling and storage. During the fermentation phase, there is spontaneous acidification of the milk and the consequent production of lactic acid. This causes the denaturation of milk proteins and a decrease in pH, giving the yogurt a creamy texture and sour taste.
Conclusion: The analysis concluded that taste and texture are the factors that most influence the quality and acceptance of yogurt, and that parameters such as culture, incubation time, processing conditions and milk base properties affect the taste, texture and consistency of yogurt. In addition, the essential amino acids needed for optimum health are present in this food.

Keywords: yogurt, production, bacterial cultures, fermentation, pH

LOSS OF QUALITY DURING THE MANUFACTURE OF CANNED TUNA PRODUCTS

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Introduction: From the moment the fish is caught till it arrives at the consumer as a canned product, raw matter is submitted to a variety of industrial steps. As a result, labile and essential nutrients (proteins, vitamins, lipids, minerals) present in the raw fish are exposed to different processing conditions that can reduce the nutritional and sensory values of the final product.
Objectives: Analyze the detrimental changes produced in each of the steps involved in the manufacture of canned tuna.
Methods: Literature review was conducted through Sage Journals and Sciencedirect databases, using the expressions “processes canned tuna”. It was obtained three hundred and seventy-two articles from the last five years. After reading the titles and the abstract, twenty seven articles were selected. Of these, 5 articles were selected for full reading and analysis.
Results: Actual research shows that previous processing (chilling, freezing, cooking) until sterilization and canned storage can lead to the formation of metabolites that can interact with tuna constituents (proteins, especially) to produce quality losses. Also, beneficial constituents (proteins, unsaturated fatty acids, vitamins) can break down during such pretreatments and be lost in the final product.
Conclusion: New and current technological strategies are recommended to increase the shelf life of previously stored material and to retain sensory and nutritional quality in the final canned product.

Keywords: Canned tuna, Nutritional quality, Food processes

HYDROLYZED FLOUR TECHNOLOGY

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Introduction: Enzymatic hydrolysis is a common practice in the food industry to improve the texture and digestibility of products. However, its impact on the nutritional value of foods has been the subject of growing interest. Although sugar-free options are promoted as healthier alternatives, they are not always the best choice for children, due to the potential increase in the glycaemic index associated with certain types of hydrolysis.
Objective: To analyse the technological benefits and nutritional impacts of enzymatic hydrolysis in baby food.
Methodology: A mixed methodology was carried out involving a literature review in the ScienceDirect, PubMed and MDPI databases, obtaining 640 articles from the last five years, of which 12 were selected for full reading and analysis; and market analysis to compare the nutritional value depending on the hydrolysis process.
Results: It was realised that starch-based products can undergo three treatments: physical, chemical or enzymatic. Specifically, the hydrolysis of starch produces dextrose equivalents (DE), such as maltodextrins, glucose syrups and maltose. Extrusion and hydrolysis processes are used in the production of baby porridge to guarantee the functionality and quality of the product. Studies have shown that babies don't differentiate between the sweet taste of hydrolysed porridge and normal porridge, such as the study comparing Nestum zero chocolate and Nestum normal chocolate.
Conclusion: Enzymatic hydrolysis in baby food has a beneficial influence on improving the texture and digestibility of the products, although it is crucial to consider its potential nutritional impacts.

Keywords: hydrolysis, glycaemic index, wheat flour, food technology.

Discipline: Technology and Galenic Pharmacy II

Professor: Jorge Balteiro

Degree: Pharmacy

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Edition 21/2024

AROMA AND FLAVOR CORRECTING AGENTS

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Flavoring agents are used to improve the taste and aroma of medicines, making them more pleasant for the patient. Flavorings are substances or mixtures of natural or synthetic origin intended to improve the aroma and taste of the drugs in which they are used. They are classified as natural when they are obtained from natural products. Synthetic when they are manufactured in a laboratory to replicate specific aromas. Or in mixtures, being divided into reinforced flavoring materials, natural flavorings whose aroma is reinforced by the addition of natural or synthetic materials, or flavoring compounds, mixtures of one or more natural or synthetic flavorings. Citrus flavorings are used in antihistamines, menthol flavorings are characteristic of antacid formulations and fruity flavorings are intended for the pediatric population. Sweeteners improve the palatability of the product. Their aim is to mask the unpleasant taste of the active ingredients or excipients in order to ensure better adherence to therapy by patients. The most commonly used natural sweeteners are sucrose, dextrose, fructose and lactose. Sorbitol, mannitol and xylitol are used in patients with diabetes mellitus. Artificial sweeteners are chemical compounds produced in laboratories that provide a sweet taste without the calories associated with sugar. The choice of flavorings and sweeteners will depend on the nature of the active ingredient, the target population, the intended dosage formulation and patient-specific considerations.

Keywords: Flavorings; Sweeteners; Aroma; Flavor

PRESERVATIVE AGENTS

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The preservative agents are added to a formulation to extend its lifetime, keeping their initial characteristics. They act by inhibiting the growth of microorganisms, slowing down chemical reactions, or preventing physical changes. The concentration of preservative added must be the minimum necessary to guarantee its action. Preservatives requirements: continuous action, fast acting, non-toxic, stable, soluble, odorless, no interactions with the packaging container, be compatible with the remaining components of the formula. Examples of preservatives used in pharmacy: parabens, benzyl alcohol, sorbic acid and benzoic acid. Preservatives in solutions for oral administration should not change the color, smell, or flavor of solutions. These include parabens, compounds very used that have a broad antimicrobial spectrum, but have a risk of being inactivated by certain chemicals, this must be considered to ensure their effectiveness and security. Given the lack of contact with the internal environment, preservatives in solutions for external use offer more options compared to the previous ones. Various compounds are used, such as benzoic acid, an antimicrobial preservative, pH dependent. The combination of preservatives increases the spectrum of action, reduces toxic effects and is more effective compared to using a single one. In short, preservatives are important in preservation of pharmaceutical products, preventing the proliferation of microorganisms, avoiding the deterioration of the product and ensuring its conservation. The selection of effective, stable and safe substances and the consideration of possible interactions are crucial to ensure safety and quality preservation.

Keywords: Preservative agents; Conservation; Efficiency; Stability; Safety

ANTIHYDROLYTIC AGENTS

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Antihydrolytic agents play a crucial role in the preservation and stability of pharmaceutical formulations. Their main objective is to prevent degradation caused by water, maintaining the integrity of the physical and chemical properties of materials. They act by minimizing or inhibiting hydrolysis, one of the main causes of drug degradation. Thus, antihydrolytic agents replace water with non-aqueous solvents and can create physical barriers that prevent water penetration into the materials. In the pharmaceutical industry, these agents are widely used in various dosage forms, preventing the degradation of active molecules and extending the shelf life of products. Common examples of antihydrolytic agents include propylene glycol, glycerin, and sorbitol solution, which help maintain the integrity of active molecules in formulations ranging from liquids to solids. In the formulation of liquid or semi-solid medications, antihydrolytic agents can be added to stabilize the formulation and prevent phase separation or drug degradation due to hydrolysis. For solid formulations, antihydrolytic agents are often incorporated during the manufacturing process to protect the drug from moisture present in the environment and associated degradation. Effectively, the process of incorporating antihydrolytic agents may simultaneously involve the use of other substances, such as corrective agents, binders, or adjuvants, which reduce susceptibility to hydrolysis. Ultimately, careful selection of excipients is crucial to ensure chemical compatibility and stability of the final product.

Keywords: Antihydrolytic agents; Drug degradation; Hydrolysis inhibition; Formulation stability

Discipline: Technology and Galenic Pharmacy II

Professor: Jorge Balteiro

Degree: Pharmacy

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Edition 21/2024

GLASS CONTAINERS IN PHARMACIES

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Drug packaging is crucial in the pharmaceutical industry, offering protection, information and convenience. Glass containers play a crucial role and are classified into three main types: type I for sensitive products, type II for less sensitive products and type III for products that are not sensitive to interaction with the container. In terms of shape and use, there are a variety of options available, such as vials, ampoules and dropper bottles.

Despite the advantages of glass containers, such as preserving chemical stability and recyclability, their fragility increases the risk of breakage during handling and transportation, resulting in losses and potential safety risks. In addition, glass is heavier, increasing transportation and storage costs, and its manufacturing and transportation process can be more expensive, impacting total production costs and the final price for the consumer.

Regardless of the disadvantages, there has been an increase in demand for glass containers due to consumers' environmental awareness. Their preference is due to the perception that they are safer, more recyclable and less harmful to the environment. This reflects a shift towards more sustainable and responsible consumption practices.

Keywords: Drug packaging; Glass containers; Recyclability; Safety risks

WAXES AS EXCIPIENTS

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Waxes have a fundamental role when developing pharmaceutical products, contribuiting to it's physical properties, stability and therapeutic efficacy. Originating from natural sources like bees, plants and minerals, or, synthetically produced, they are chosen based on their specific characteristics. Used as thickners in topical formulations, facilitating the aplication and adhesion to the skin, and as emollients for it's capacity of forming a protective barrier on the skin, softening, preventing loss of water and improving skin hydration. Also utilized as consistency agents in solid pharmaceutical formulations facilitating it's handling, storage and administration to the patient. Bee wax is old, natural and the most used in galenic pharmacy. It has emollient, hydrating and antioxidant properties, being used in skin formulations. Carnauba wax, known for it's hardness, high melting point and unique shine, is used as lubricating and coating agent. Candelilla wax has emollient and thickening properties due to it's capacity to give smoothness, shine and stability to the formulations. Microcrystalline wax has concistency, stability and controlled release properties. Spermaceti wax has emollient and softening properties. Waxes perform several functions in galenic pharmacy and it's aplication is essential for the development of effective, stable and safe pharmaceutical formulations. Understanding the properties and specific characteristics of each type of wax, formulators can optimize the performance and quality of pharmaceutical products, meeting the needs of patients and healthcare professionals.

Keywords: Wax; Pharmaceutical formulation; Excipients

PROPYLENE GLYCOL

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Propylene glycol is a chemical substance used on a large scale as an excipient in a myriad of products. From 1930 onwards, new alternatives for the production of this substance were developed by industries in order to increase the yield of the process. Propylene glycol, a small molecule (C3H8O2 OR CH3CHOHCH2OH) also known by IUPAC nomenclature, propane-1,2-diol, is an organic compound, an alcohol diol, more dense than water, viscous, bitter in taste, odorless and colorless, which is hygroscopic and miscible with water, acetone and chloroform. It dissolves numerous essences, resins and dyes, but not the oils.

Propylene glycol has several uses, we list some examples below: as moisturizer, humectant type, in medicines, cosmetics, toothpastes and antiseptics mouthpieces; as a medical and sexual lubricant; as a solvent for food coloring and flavorings; as an adjuvant in ointments; as a solvent in cases of active ingredients insoluble in water or in aqueous solution.

Propylene glycol is an example of a hydrophilic excipient used in the preparation of forms semisolid pharmaceuticals. Some adverse reactions may occur due to the use of propylene glycol. Scientific studies demonstrate that propylene glycol can penetrate the skin and be absorbed by our body, It can cause irritation and allergies in people with sensitive skin. Furthermore, there are concerns regarding its potential hormonal disrupting effect. Therefore, a contraindication to the use of propylene glycol is hypersensitivity to it.

Keywords: Propylene glycol; Excipient; Pharmaceutical Forms; Hypersensitivity

SATURATED SOLUTIONS

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Saturated solutions are those in which the maximum amount of solute has been reached by the solvent at a given temperature. The saturation of a solution depends on several factors, such as the chemical nature of the solute and solvent, temperature, pressure, polarity and particle size. A chemical compatibility and polarity dire ctly influence the solubility of a solution: substances with a chemical affinity tend to increase solubility, while polar substances are more soluble in polar solvents. In addition, pressure has a greater effect on the solubility of gases in liquids and smaller particles have more surface area available to interact with the solvent, speeding up the dissolution process. Solubility is an intrinsic physicochemical property of drugs that´s fundamental in the formulation of pharmaceutical forms. Parameters such as the ionization constant (pKa) and the oil-water partition coefficient are considered to predict and optimize solubility. The temperature increase generally increases solubility, but can be influenced by the solute and solvent, being positive in endothermic processes and negative in exothermic processes. Poorly soluble drugs can have their solubility increased by the addition of co-solvents, such as ethanol, propylene glycol or glycerine, which lead to the breaking of hydrophobic bonds. Solubilization depends on the chemical structure of the drug, the more apolar, the greater dissolution. The oil-water sharing coefficient indicates the affinity of a drug for the aqueous or oily phase and its ability to cross biological barriers, influencing its bioavailability. In short, understanding the properties of saturated solutions is crucial in several areas. The solubility of drugs is a critical aspect in the formulation of pharmaceutical forms. It is influenced by several factors, and its optimization can improve therapeutic efficacy.

Keywords: Solution; Solubility; Solubility coefficient

SEMI-SYNTHETIC EXCIPIENTS PREPARING SUPPOSITORIES

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Suppositories are solid pharmaceutical forms administered rectally with local or systemic action, with a unit dose containing one or more active ingredients. A smooth surface must be guaranteed, without roughness or crystallization of the drugs. The mass of a suppository is generally between 1 and 3g, from 2 to 3g for adults and from 1.5 to 2g for children.

The excipients used are mainly fat-soluble and water-dispersible and must melt at a temperature below 37ºC in less than 10 minutes. It must have viscosity when melted, avoiding the deposition of insoluble drugs and, also, a low acidity index and contract after melting due to cooling. Among the most common fat-soluble excipients are the semi-synthetic ones, such as semi-synthetic glycerides (Estarinum, Imhausen, Staãimol, Witepsol, Massupol, Suppocire, Oleo-cire h — Supane, Massa Mf 13, Supomasse and Supponal) which come from natural sources and are chemically modified to impart specific characteristics to the suppositories. The most commonly used are modified semi-synthetic glycerides, such as those from the Witepsol series (H, W, E, S, ET), Estarinum (A, B, C, D, E) and fat-acid esters (Suppocire). Lauric acid triglycerides (Massupol) and masses consisting of alcohols or non-glyceride esters (DHW masses) are also used. Furthermore, there are mixed or complex excipients (Suppostal and Suppolan) that contain the active ingredient and other components to improve properties such as lubrication, stabilization, and ease of administration of the medication. A careful choice of excipient is essential and depends on the characteristics of the active ingredient and the physical and release properties desired for the suppository. These must be harmless and compatible with the active ingredient, and it is important to highlight that the exact composition of the suppositories may vary according to the manufacturer and the specific formulation of the product.

Keywords: Suppository; Excipients; Semi-synthetic; Fat-soluble; Water-dispersible

HYDROGENATION OF VEGETABLE OILS

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Hydrogenation is a chemical procedure that consists of removing unsaturated functional groups through the addition of hydrogen atoms. Vegetable oil is an organic compound extracted from plants. Its properties vary depending on the raw material and extraction. These are used in the food and cosmetic industries as well as in the pharmaceutical industry for parenteral nutrition, for the manufacture of nutritional emulsions, excipients in injectable formulations; extended-release depot formulations; poor water-soluble drugs and topical formulations. Hydrogenation occurs due to the addition of hydrogen at high pressure and temperatures in the presence of a catalyst. This has two objectives: to provide more oxidative stability to the oil and to convert its melting point. This ends up increasing their shelf life, reducing costs and even improving their texture and flavor. There are two types of hydrogenated oils: partially hydrogenated, which ensures a degree of unsaturation in the final product, and fully hydrogenated, used to transform liquid oils into solids at room temperature. In a pharmaceutical context, hydrogenated vegetable oils are used in tablets, creams, orodispersibles, among others, since they have binding and lubricating properties. Oils can also be used as emollients and viscosifiers for emulsions, being widely used in creams, sunscreens and more. In short, the vegetable oil hydrogenation process is useful for several industries as it stabilizes products, changes their melting point, viscosity and texture.

Keywords: Hydrogenation; Vegetable oils; Hydrogenated oils; Pharmaceutical use

DISTILLATED WATER

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Water is the most used solvent in Pharmacy, because dissolves a lot of substances and is one of the normal constituents of tissues, causing no physiological effect. However, along with the most important advantages such as being cheap, having a good dissolution capacity and physiological inert, it doesn't live without inconveniences, like microbial contamination and chemical instability, which can lead to the destruction or inactivation of the substances. There are a small number of preparations made with drinkable water and the others are made with water treated for a lot of processes, one of them distillation, resulting the distillated water, with is the most used vehicle in Pharmacy. First, drinkable water passes for a distillation process, where it is purified till origin distillated water. This process requires the use of a lot of glass gadgets ("Schott-Jena" or "Vel" gadgets), both gifted with high hydrolith resistance) or metal gadgets ("Manesty" gadget), that comply technical or economic requisites, exalting that they shouldn't give any of their compounds to water. Finally, the obtained water can't be pyrogenic or contain metals or dissolved gases, respecting the hard trials of quality control. We store it away from light and the air in though glass recipients, who don't give off any of their compounds, so that the water keeps the integrity and ideals characteristics.

Keywords: Distillated water; Distillation; Vehicle; Physiological inert

Discipline: Physiology II

Professor: Paulo Matafome

Degree: Physiotherapy

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Edition 21/2024

ASTHMA MECHANISMS AND RESPIRATORY FUNCTIONAL TESTS

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Asthma is an obstructive respiratory condition that causes chronic airway inflammation and expiratory airflow limitation. Its symptoms stem from chronic airway inflammation due to exposure to allergens or irritants. They can be: shortness of breath, wheezing, coughing and chest tightness. Asthma is broken down into types, such as intermittent or persistent. It can also be allergic and non-allergic (outside factors).

During an asthma attack the muscles around the airways constrict making the airways narrow, their lining become swollen and the body creates more mucus. That said, the inhalation of an antigen stimulates the differentiation of B lymphocytes into plasmocytes. This will cause the liberation of cytokines by lymphocytes cells. A repeated allergen exposure increases allergen-specific IgE levels and, by receptor cross-linking, triggers release of inflammatory mediators from mast cells and basophils.

Spirometry and other tests assess lung function. After a spirometry, bronchodilators are administered to assess reversibility of airflow obstruction which leads to a bronchodilator responsiveness test. Another one is bronchial provocation test which evaluate non-specific bronchial hyperresponsiveness using agents like methacholine. The serial peak expiratory flow, the occupational asthma system and the specific inhalation challenge are tests that track asthma symptoms and causes.

Asthma has no cure, but administrating bronchodilators, antihistamines, corticosteroids, anticholinergics may help. Using respiratory physiotherapy helps ‘normalizing’ breathing patterns by adopting a slower respiratory rate with longer expiration and reducing hyperventilation and hyperinflation. For example, the Buteyko breathing technique was based on the theory that asthmatic bronchospasm is caused by hyperventilation, leading to a low PaCO2.

Keywords: Obstructive respiratory condition, Asthma Attack, Bronchodilators, Buteyko breathing technique

ERYTHROPOIETIN – PHYSIOLOGY AND PATHOPHYSIOLOGY OF ABUSE

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Erythropoietin (EPO) is a hormone naturally produced in the kidneys and plays a crucial role in regulating the production of red blood cells in the bone marrow, structures responsible for transporting oxygen in the bloodstream. EPO is synthesized mainly in specific epithelial cells that line the renal peritubular capillaries when O2 levels are reduced (the erythropoiesis process). It is, therefore, used clinically to treat conditions associated with anemia, such as chronic kidney failure, cancer and chemotherapy treatment.

In high-performance sports, erythropoietin has been used illicitly to improve athletic performance, once that, by increasing the production of red blood cells, it improves the ability to transport oxygen to the muscles, this increasing resistance, the production of aerobic energy and athletic performance. However, the use of this substance in these circumstances is prohibited by sports organizations and is considered doping. Furthermore, it can bring serious health risks, as the excessive increase in red blood cells can lead to an exponential increase in blood viscosity, increasing the risk of blood clots, strokes and heart attacks.

In a physical therapy context, mainly in the sports area, understanding the possible misuse of EPO is very important. It is crucial to recognize the signs and symptoms, especially those involved in high-intensity sports or in patients recovering from injuries related to illegal use of EPO. Physical therapists are expected to collaborate with other healthcare professionals to address the effects of EPO abuse on patients' health and rehabilitation process.

Finally, inappropriate use of EPO can lead to overload of organs causing long-term damage.

Keywords: Erythropoietin, Red Blood Cells, Erythropoiesis, Sports, Physiotherapy

COAGULATION REGULATORS (ANTICOAGULANTS) AND TESTS

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Whenever a vessel ruptures, there's no longer endothelium, as consequence there is a loss of vasodilators and anti-aggregation factors, so in an attempt to maintain hemostasis, platelets activate, connecting to collagen, which is exposed. They form an aggregate in the vessel wall, releasing thromboxane A2, responsible for vasoconstriction, a platelet plug that will later implement a clot and fibrous tissue, due to the activation of the common pathway in the coagulation cascade, restoring vessels.

The anticoagulants' goal is to prevent the expression of thrombosis. The thrombosis happens when there's an excessive production of thrombin in the location of the endothelial damage that leads to the platelet aggregation. When this aggregation loosens it can get stuck on the small vessels and cause ischemia. Anticoagulants are essential for people with heart failure. Warfarin is the most common anticoagulant. However, a new generation of anticoagulants has been developed, known as "new oral anticoagulants" or NOACs, which are just as effective as the "old" anticoagulants and do not require routine testing.

Coagulogram is a set of blood tests to evaluate the blood coagulation process. This exam consists on the Bleeding time (BT): measures how long it takes for bleeding to stop after a cut, Activated Prothrombin Time (APT): measures the time it takes for plasma to form a clot, Activated Partial Thromboplastin Time (aPTT): evaluates the levels of procoagulants involved in thrombin production on the surface of activated platelets, International Normalized Ratio (INR) which is calculated and compared to the international sensitivity index.

Keywords: Anticoagulant, thrombosis, Coagulogram, platelet plug, coagulation cascade

RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM/ ACE INHIBITORS AND AT1 RECEPTORS

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The renin-angiotensin aldosterone system (RAAS) is a hormonal cascade that functions in the homeostatic control of arterial pressure, tissue perfusion, and extracellular volume. Dysregulation of the RAAS plays an important role in the pathogenesis of cardiovascular and renal disorders. The classical understanding of RAAS is that it comprises three significant compounds: renin, angiotensin II, and aldosterone

The RAAS is initiated by the regulated secretion of renin, the rate-limiting enzyme that catalyzes the hydrolysis of angiotensin (Ang) I from the N-terminus of angiotensinogen. Ang I is in turn hydrolyzed by angiotensin-converting enzyme (ACE) to form Ang II, a potent vasoconstrictor and the primary active product of the RAAS. Recent evidence has suggested that other metabolites of Ang I and II may have biological activity, particularly in tissues. Development of agents that block the RAAS (e.g., beta blockers, ACE inhibitors [ACE Is], and angiotensin receptor blockers [ARBs]) began as a therapeutic strategy to treat hypertension.

ACE inhibitors and angiotensin receptor blockers, aim to manage hypertension by reducing vasoconstriction and aldosterone release. The angiotensin II type 1 receptor (AT1 receptor) plays a significant role, promoting pathways linked to hypertension and vascular damage.

Studies indicate that exercise training can lower RAAS parameters, sympathetic nervous system activity, and overall blood pressure, despite minimal change in plasma renin activity. Physiotherapy is pivotal in prescribing tailored exercise regimens, crucial for improving cardiovascular health and blood pressure management in patients. Understanding how exercise impacts physiological systems informs personalized treatment approaches.

Keywords: RAAS, hypertension, vascular damage

Discipline: Physiology II

Professor: Paulo Matafome

Degree: Physiotherapy

A 120

Edition 21/2024

MOTOR CHANGES IN ENDOCRINE SYNDROMES

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The immune system comprises a complex network of organs, cells, and tissues tasked with safeguarding the body against pathogens while also preventing their potential consequences. Autoimmune diseases manifest as a result of dysregulation within the immune system, prompting the body to mount attacks against its own cells. Some autoimmune diseases compromise motor functions by inducing alterations in them. Among these conditions, two notable examples are Multiple Sclerosis and Rheumatoid Arthritis. Multiple sclerosis is a disorder characterized by the immune system's attack on the myelin sheath, the protective covering of nerve fibers in the brain, optic nerve, and spinal cord. The myelin sheath is crucial for the proper conduction of nerve impulses along the nerve fibers. Rheumatoid arthritis is also an inflammatory disease, but it occurs in the joints.The release of inflammatory mediators and various enzymes contributes to the systemic and articular manifestations of rheumatoid arthritis, such as cartilaginous and osseous destruction. Given that both diseases compromise motor functions, we perceive that physiotherapy plays a crucial role in the rehabilitation process, as physiotherapists can intervene at every stage of the disease to address functional deficits. All treatment plans must be to the patient's clinical condition, allowing the physiotherapist to employ a variety of techniques including hydrotherapy, strength and flexibility exercises, gait and balance training, among other.

Keywords: Immune system ; Motor functions; Autoimmune diseases

INFLAMMATORY BOWEL DISEASE

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Inflammatory bowel diseases (IBD) are a group of conditions that cause inflammation and irritation in the gastrointestinal tract. The most common forms are Crohn's disease and ulcerative colitis. The etiology of IBD is complex and multifactorial, involving an interaction between genetic, environmental, and immunological factors. Several genes have been associated with IBD, but none have yet been considered to play a determinant role in the development of these conditions. IBD is characterized by an abnormal inflammatory response of the immune system of the intestinal mucosa this response is directed against components of the gut microbiota, leading to inflammation and mucosal damage. The specific pathological mechanisms of IBD are not yet fully understood, however, abnormal T-cell activation and inflammatory cytokine production are thought to play an important role, recent studies demonstrate that activated T cells release cytokines that promote inflammation and mucus production leading to chronic inflammation which in turn leads to damage to the intestinal mucosa, ulcers, bleeding, and even intestinal obstruction. Although not considered an autoimmune condition IBD's most common manifestations ultimately produce a heterogeneous state of chronic intestinal inflammation with no exact known cause. Intestinal innate immunity is enacted by neutrophils, monocytes, macrophages, and dendritic cells, innate lymphoid cells, and Natural Killer cells, these cells defend against pathogens and excessive entry of intestinal microorganisms, while preserving immune tolerance to resident intestinal microbiota. In many cases IBD present secondary effects who can affect the human movement system. Fatigue, sarcopenia and osteopenia can be experienced by IBD patients. Other health professionals beyond doctors can treat these types of symptoms more efficiently as, for example, physiotherapists, who are the most recommended professionals to work in this area, techniques performed by physiotherapists, like abdominal massage, can help IBD patients dealing with their symptoms too.

Keywords: Inflammatory bowel diseases (IBD), Physiotherapy, Crohn's disease, Ulcerative colitis.

ENDOCRINE AND METABOLIC FUNCTION OF WHITE ADIPOSE TISSUE

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White adipose tissue is important in our body, being involved in metabolic processes. It is made up of adipocytes, responsible for the secretion of cytokines, energy production, insulation and body protection. This tissue accumulates in multiple body areas, in the subcutaneous region, surrounding the organs (visceral) and in the bone marrow. Regarding metabolic function, this tissue stores energy in the form of triglycerides and releases it according to body needs through the breakdown of fat, stored fatty acids and glycerol (lipid metabolism). Lipid droplets are intracellular organelles that store triglycerides and phospholipids. Proteins such as cell death activator (CIDEC), seipin, and perilipin are found in the lipid droplet membrane. This tissue is a dynamic organ that communicates with other tissues to regulate metabolism and maintain homeostasis, serving for energy storage, but it is also an active endocrine organ that communicates with other tissues of the body to regulate metabolism, energy balance and general health, also protecting organs against mechanical shocks. Regarding endocrine function, white adipose tissue secretes adipokines, which are important in regulating energy balance, appetite, insulin sensitivity, inflammation, general metabolism and metabolic homeostasis (leptin and adiponectin).

If there is a higher intake of lipids and carbohydrates than the body will need to consume for its activity, fat is stored in white adipose tissue, within adipocytes that expand through hypertrophy or hyperplasia, which can lead to obesity. Physiotherapy stands out in this pathology in terms of posture, recovery of physical mobility, reduction of pain and prevention of worsening of the condition.

Keywords: white adipose tissue, endocrine function, metabolic function, leptin, adipocytes

NON-ALCOHOLIC FATTY LIVER DISEASE, CHOLESTEROL METABOLISM AND STATINS

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Non-alcoholic fatty liver is a hepatic pathology related to excessive accumulation of fat in liver cells in people who consume little or no alcohol.

Due to the increase in liver lipids, there is greater production of cholesterol. Cholesterol is a lipid made up of a long-chain polycyclic alcohol found in cell membranes and blood plasma. This molecule is mainly synthesized through acetyl-CoA but can also be obtained through food.

Cholesterol is most abundant in tissues that synthesize it or have densely packed membranes, such as the liver and arteries, since after its synthesis, as it is insoluble in the blood, it is transported in the bloodstream by lipoproteins, which can vary according to their density into low-density lipoproteins (LDL) and high-density lipoproteins (HDL). LDL is believed to be harmful to the human body once it is capable of transporting cholesterol from the liver to the cells of various tissues, thus contributing to the formation of atherosclerotic plaques. On the other hand, HDL is able to absorb cholesterol crystals, which begin to deposit on the arterial walls, thus transporting it to the liver, where it is then eliminated.

Statins are a medicine used to treat hypercholesterolemia and prevent atherosclerosis. With regard to cholesterol, statins inhibit the HMG-CoA reductase enzyme, which is responsible for regulating it in the liver, promoting a decrease in the production of cholesterol, mainly LDL, and an increase in LDH.

Physiotherapy related to physical activity can play an important role in reducing these conditions.

Keywords: Liver, cholesterol, statins

MOTOR CHANGES IN ENDOCRINE SYNDROMES

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The endocrine system releases and produces several hormones directly to the blood flow, controlling many body functions such as growth, metabolism, reproduction, stress response and mood. This system is composed by the endocrine glands, which are the pineal, pituitary, thyroid, parathyroid and adrenal, and by single cells and small cell clusters in the thorax and abdomen, the paraganglia.

If your hormone levels are too high or too low or your body does not respond to hormones the way it is supposed to, you may have an endocrine disease or disorder.

Muscle disturbances caused by endocrine disorders are mainly due to alterations in the protein and carbohydrate metabolisms. Either a deficiency or excess of hormones produced by the glands can cause muscle dysfunction.

Some examples of endocrine diseases are hyperthyroidism in which the thyroid releases high hormone levels that may cause the increase of heart rate and blood pressure. The opposite can also happen, leading to bruises on the face, hoarse voice, slow speech, among others. A child's growth can also be affected due to the lack of the growing hormone.

Cushing's disease is an endocrine disease characterized by high levels of the adrenocorticotropic hormone (ACTH), leading to moon face, truncal obesity, bruising and thin arms and legs.

A common complaint of cushing's disease patients is fatigue and muscle weakness. Physical therapy can help by strengthening, training and reducing tension in muscles. Physical therapists are also able to reduce and eliminate joint pain and increase joint mobility through manual therapy.

Keywords: Endocrine system; Endocrine diseases; Cushing's disease; Physical therapy

SCHOOL NUTRITION IN FOCUS: EVALUATION OF FOOD SUPPLY

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Introduction: School is a privileged and decisive place for training young people, as the offer presented will have a huge impact on the choices made and, therefore, on the health of students. As a diagnosis, a survey was carried out regarding the food in the bar and vending machines, among students and teachers, and an analysis of the products displayed for sale in these same places. According to the results obtained, 56.3% of respondents rarely buy food at the school bar. As for dietary restrictions, 96.9% believe that the school should have more options in this regard. According to the analysis carried out, there was a predominance of sugary foods and little variety.
Objectives: Build a food policy to be implemented in the ESTESC bar and vending machines.
Methods: The policy to be constructed will be implemented in the 2024/2025 academic year, in order to be maintained, based on the conclusions drawn from the questionnaire applied to students and teachers and the analysis carried out.
Results: According to the results of the diagnosis, it was decided to apply 16 measures, more specifically two each month. This is in order to make all fractions of the food wheel present, increase the variety of options for vegetarians, allergies and food intolerances, reduce sugary foods and promote food consumption at school. Subsequently, carry out a questionnaire in order to monitor what has been implemented.
Conclusion: With this policy we intend to improve the food supply, in terms of diversity and promote adherence.

Keywords: Food supply; School; Healthy; Food choices

A NEW LOOK AT SASIPC'S FOOD OFFER

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Introduction: The food offered in university bars is an important contributor to students' nutrition. After carrying out a questionnaire to the community of the polytechnic university of coimbra 86.8% of students were receptive to a healthier offer and more diversified. An analysis conducted on the bars of the schools of the Polytechnic Institute of Coimbra also showed a layout of food geared towards those whose nutritional profile is questionable and if we look at the Mediterranean food wheel, we quickly realize that it is difficult to include them in one of the proposed groups.
Objectives: Proposing nutritional policies aimed at improving the food on offer from the point of view of its health benefits, as well as improving the way it is advertised.
Methods: A student satisfaction questionnaire was carried out, as well as an analysis of the food on offer in the bars of the universities of the Polytechnic University of Coimbra.
Results: Two nutritional policies were proposed, one to improve the purchase environment and the other to optimize the acquisition service.
Conclusion: With our policies, we hope to propose an intervention that positively affects the community of the polytechnic university of coimbra.

Keywords: policy, nutrition, environment, community, students

NUTRITIONAL POLICY: PROMOTING SUSTAINABILITY THROUGH COMPOSTING

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Introduction: Food waste represents a significant global challenge. Portugal, like many countries, faces this problem, wasting approximately 1 million tonnes of food every year. In addition to moral and social concerns, food waste exacerbates environmental issues, contributing significantly to climate change. Urgent interventions are imperative. At the School of Health Technology in Coimbra, a 50 per cent improvement in waste reduction was observed through implemented measures, although a substantial amount, especially soup, is still wasted. However, efforts to reduce leftovers appear to be effective. The characteristics of each academic community within the IPC institutions influence the daily variation in waste.

Objective: The aim is to develop a food policy for SAS IPC, aligned with two of the 17 Sustainable Development Goals for 2030.

Methodologically, a diagnosis of the situation was carried out by analysing activity reports, namely that of SAS IPC, interviews with employees and the nutritionist and consultation of guiding documents.

Results: The proposed policy, which will run for two years, focuses on the efficient utilisation of waste, staff training and the promotion of literacy. Measures include composting, staff training on portion control and sustainability awareness campaigns. Partnerships with composting companies and agricultural entities will be established to maximise results. Monitoring criteria include weighing leftovers, attending lectures and staff training sessions, with evaluation indicators such as awareness levels and percentages of leftover reduction.

Conclusion: The aim of implementing this policy is to reduce waste, particularly leftovers, the aspect least worked on within the SAS IPC.

Keywords: Food waste, Nutrition policy, Composting

NUTRITION POLITICAL: HEALTH AND SUSTENTABLE FOOD ON SOCIAL ACTION SERVICE AT THE POLYTECHNIC OF COIMBRA

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Introduction: The eating habits of the university students in Portugal are inadequate, which is contributing to overweight and the appearance of comorbidities. The Universitys beyond the central role in teaching and intellectual development, should take an active role in health promotion, aiming to create environments favorable to the healthy choices of their community.
Objective: Implement a nutritional and food policy in the Social Action Services of the Polytechnic Institute of Coimbra (SAS).
Metodology: It was applied a questionnaire within the Nutritional Policy Curricular Unit, which aims to characterize the food supply of the Social Action Services of the Polytechnic Institute of Coimbra, in which we obtained 47 responses and after analyzing them we extracted the most important results for the implementation of our policy. The document EIPAS – Integrated Strategy for the Promotion of Healthy Eating was also used.
Results: The measures of the Nutritional and Food Policy model to be implemented will be in a period of 2 years. In the first year, the focus will be the following axes: Improve food quality; Improve accessibility; Promote the dissemination of information on healthy eating. In the second year will be the canteen with the axes: Promote the Mediterranean diet; Promote interest in healthy and sustainable eating; Reduce food waste.
Conclusion: With the policies implemented, we hope to contribute to improve the choices and eating habits of the IPC school community.

Keywords: Key words: “school community”, “nutrition policy”, “healthy eating”, “food supply”

NUTRITIONAL POLICY: IMPROVE THE FOOD OFFER OF THE SASIPC BAR

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Introduction: Poor eating habits are the third main risk factor that contributes most to the total number of years of healthy life lost, accounting for the loss of around 300,000 years of healthy life in Portugal. Energy intake tends to be higher in school environments and in higher education, where bars contribute significantly to poor eating habits. After a questionnaire was carried out and 65 responses were obtained, the majority of the population (92.1%) felt that the bar offer could be improved.
Objectives: To develop a policy to be implemented in the SASIPC bars in order to improve their nutritional quality.
Methods: The nutritional policy was developed according to the identification of the problems reflected in the questionnaire carried out using Google Forms in February. IAN-AF and PNPAS were also used as additional support.
Results: This policy will be implemented between 2024 and 2025. Some of the measures to be implemented are based on 3 axes: improving supply, improving availability and making products available for intolerant/allergy sufferers. In order to do that its needed the increase of supply and variety of bread, as well as its arrangement in the shop window, increase the variety of fruit sold, increase the variety of sandwiches, reduce the supply of soft drinks and, depending on need, increase the supply of products suitable for allergy sufferers and intolerant people.
Conclusion: It is expected that this policy will contribute to satisfy the nutritional necessities of the SASIPC users.

Keywords: "Nutrition Policy", "School Bar", "Food Supply”

SNACK TIME REVOLUTION: CULTIVATING HEALTHIER EATING HABITS IN IPC

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Introduction: In Portugal, the prevalence of overweight has been increasing in both adults and young adults. Educational institutions play a decisive role in changing eating behaviour. Around 55,3% of students at the Instituto Politécnico de Coimbra (IPC) eat their snacks at school, and 86,8% think it would be useful to have more options for balanced snacks, so it would be important to improve the food offer in the IPC's bars.

Aim: Create a nutritional policy for the Instituto Politécnico de Coimbra.

Methods: Application of a questionnaire to the IPC students and analysis of documents with guidelines.

Results: This nutritional policy would be implemented during the 2024/2025 school year.

In order to implement this policy, our strategies will be to train staff on the importance of healthy eating, organise workshops/showcooking to prepare healthy, varied and balanced snacks, listen to IPC students' opinions/suggestions for improvement on the food they would like to have in the bar, publicise on social media and distribute flyers to promote the bar's new snack options, include snacks in the lunch ticket and improve the food on offer in the IPC bar.

Conclusion: The aim of this policy is to help reverse the prevalence of obesity and contribute to a healthier and more balanced diet in the IPC community.

Keywords: "Healthy Snacks" "Health Promotion" "Young Adults" "Lifestyle Habits" "Nutritional Policy"

CONSTRUCTION OF A NUTRITIONAL POLICY FOR THE IPC

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Vending machines are a quick and easy option for purchasing snacks and quick meals, and are widely used by the academic community, with 51,4% of students surveyed being regular users. However, it's worrying that 59,5% consider that the information on the allergens present in the products sold is not clear or informative, while 35,1% express dissatisfaction with the nutritional quality of the offers and 27% believe that the variety is limited. It's crucial to restructure vending machines and available offers, to satisfy and promote different eating habits, intolerances, and allergies.

Develop and implement a nutritional policy that promotes a significant improvement in the vending machine products in IPC establishments.

The products available in vending machines were evaluated and listed and we analyzed the IAN-AF. Subsequently, a questionnaire was administered to students to assess satisfaction with the quality of its products.

The planned intervention will be structured around three axes: awareness and information; development and adaptation; monitoring and evaluation. We intend to promote nutritional understanding through the distribution of informative pamphlets and tools to decipher labels; improve the product offering to satisfy everyone's needs; conduct satisfaction surveys and evaluate the increase in demand for these machines to facilitate the implementation of the proposals and obtain the expected results, establishing partnerships with IPC establishments and with the company Luis Costa Vending, responsible for the vending machines.

By implementing a comprehensive nutritional policy, we aim to improve the quality, transparency, and diversity of food options in vending machines, catering to various dietary needs.

Keywords: "vending machine"; "nutritional policy"; "vegan"; "allergens"; "labeling".

VENDING MACHINES FOR FOOD/BEVERAGES AT THE IPC: FOOD SUPPLY CHARACTERIZATION

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Introduction: In the last years, Vending machines for food and beverages have increased their prevalence and have amplified their influence on the population's daily energy consumption. In the evaluated IPC machines , the most frequent food and beverages were still water (21,2%), biscuits and toasts (17,8%) and juices and nectars (16.1%) and 26,83% of the products available were considered as not recommended.

Objectives: Create and implement a nutritional policy to improve the food on offer in vending machines from the Instituto Politécnico de Coimbra.

Methods: Development and application of a form to evaluate the food supply from the vending machines for food and beverages present in the 6 schools of the Instituto Politécnico de Coimbra. Data collection was carried out in the second semester of the 2023/2024 school year. The categorization of food and beverages into permitted and prohibited followed the established in Despacho 7516-A/2016.

Results: The nutritional policy we plan to adopt involves enhancing the food options available in the IPC's vending machines for a year. Using strategies such as improving the disclosure of the nutritional composition of vending machine foods and enhancing the food offerings defined in the contract document. We intend to display the Nutri-Score of foods in order to raise consumer awareness.

Conclusion: It seems evident the need to reformulate the supply in the vending machines for food and beverages. With this policy we hope to improve the quality of the available products and to promote better food choices.

Keywords: Obesogenic environment, Food availability, University students, Vending machines for food and beverages

IPC NUTRITIONAL POLICY: COOKING SKILLS - GRÃO A GRÃO

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Introduction: Studies show that university students tend to change their eating habits, admitting that they have little time, which can contribute to eating more meals away from home, skipping meals or adopting deviant eating practices. Students who report having more ability to cook tend to consume fast food less often, maintaining a more balanced diet, however the consumption of this type of unhealthy food has been increasing.

Objective: To implement a Nutritional Policy in the IPC Social Action Services, based on consumer's profile.

Methodos: The research was conducted in a mixed model, based on a questionnaire applied to IPC students and a search for scientific articles on the Google Scholar platform, using the keywords "cooking skills in university students"; "eating habits in university students". Four articles were used in full.

Results: The policy outlined is based on two axes of action, one theoretical and one practical, through the offering a set of face-to-face learning sessions and the dissemination of online content. The theoretical content will be based on DGS´s recommendations for healthy eating. The practical part will consist of culinary workshops on preparation and cooking techniques. These activities will take place between September 2024 and February 2025, and will be open to the entire academic community. In the end, the implemented policy will be evaluated through satisfaction surveys and FFQ.

Conclusion: With this policy, we hope to promote healthy eating habits in the IPC community, through culinary training and increased nutritional literacy.

Keywords: Keywords: cooking skills in university students; eating habits in university students

THE IMPACT OF PSYCHOSTIMULANTS ON APPETITE AND WEIGHT

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Central nervous system stimulants, specifically psychopharmacological agents, classically amphetamines and methylphenidate, are the first-line drugs for the treatment of attention deficit hyperactivity disorder, a neurodevelopmental disorder with an estimated prevalence of 7.2% in children and 3.4% in adults.

Amphetamine and methylphenidate are both Norepinephrine and Dopamine reuptake inhibitors, which increase the synaptic availability of the neurotransmitters dopamine and norepinephrine. Amphetamine has the additional property of inhibiting Vesicular Monoamine Transporter 2, thereby increasing dopamine release. Both have a weaker affinity for the serotonin transporter.

Psychostimulants are also anorexigenic agents, they act on the brain to suppress appetite. They stimulate the hypothalamic and limbic regions that control satiety and can be used to treat obesity. In addition, amphetamines also target Cocaine-and Amphetamine-regulated Transcript Protein (CART), an anorectic peptide that inhibits both normal and starvation-induced feeding and completely blocks the feeding response induced by neuropeptide Y and regulated by leptin in the hypothalamus. The severity of the anorectic effect is related to the form, dosage, and formulation of the drug. Amphetamine and methylphenidate have a D-isomer and an L-isomer. The chirality determines the potency of NET and DAT binding. Both are also available as enantiomers, D-methylphenidate and D-amphetamine, and in prodrug formulations such as Serdexmethylphenidate and Lisdexamfetamine. With all these formulations, therapeutic efficacy can range from 4 to 16 hours. It's up to healthcare professionals and nutritionists to understand their patients' pharmacotherapy and provide individualised diets to optimise treatment and improve health.

This review aims to analyse the impact of psychostimulants on appetite.

Keywords: Psychostimulants; Appetite; Amphetamine; Methylphenidate; CART

GUT MICROBIOME OF THE HADZA HUNTER-GATHERERS.

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The Hadza hunter-gatherers, a tribe from Tanzania, not perturbed by industrialization, with reduced exposure to antibiotics and higher dependence on natural resources, have an unparallel functional gut microbiome composition. The Hadza's diet diet includes foraged starchy tubers, berries, honey, and hunted animals, during the rainy season, it is mainly comprised unrefined plant foods containing high amounts of non-digestible polysaccharides. The Hadza gut microbiome enrichment in *Prevotella*, *Treponema* and unclassified Bacteroidetes, as well as a distinct arrangement of Clostridiales taxa, may enhance the Hadza's ability to digest and extract valuable nutrients from fibrous plant foods.

On the other hand, developed and urban populations have a gut microbiome adapted to diets rich in simple sugars, animal proteins, and fat. These dietary factors require the expression of a reduced number of enzymes that target the breaking down of sugars, amino acids, and bile acids. Dietary patterns can significantly impact human health, and nutrients bioavailability is metabolically controlled by human gut microbiota. Additionally, these co-adaptive dynamics complements our physiology, immune and metabolic health. The dietary habits of western industrialised populations may have altered the metabolic network of the host-microbiota, contributing to the increase and prevalence of non-communicable diseases.

This review aims to analyse the impact of food habits on the human gut microbiome.

Keywords: Hadza Tribe; Microbiome; Gut Microbiota; Dietary Patterns

OFFICINAL VERSUS MAGISTERIAL DRUGS

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The debate between officinal and magisterial drugs in pharmaceutical practice is long-standing and involves fundamental differences in production processes, regulation, clinical purpose, and safety. Officinal drugs are produced on a large scale by pharmaceutical companies following strict quality standards, standing out for being more affordable, while magisterial drugs are prepared individually in compounding pharmacies, according to medical prescriptions to meet the unique needs of each patient. Magisterial medicines offer a significantly greater capacity for personalisation and adaptation, being prepared as prescribed to meet individual needs, while officinal medicines are less personalised, produced on a large scale and more standardised. Finally, in relation to the terms of access to availability, magistral drugs may have higher costs due to their personalization, and access may be limited in areas where there are no compounding pharmacies. However, both types of drugs are important in public health, with the choice between them depending on the needs and characteristics of each clinical situation.

Keywords: Officinal drugs; Magistral medicines; Regulation; Production; Pharmaceutical practice.

KERATOPLASTIC AND KERATOLYTIC MEDICINES

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Keratoplastic and keratolytic medicines are pharmaceutical forms of topical action, used for the treatment of skin lesions, characterized by excess skin on the epidermis. We can define keratoplastic medicines as drugs that produce a regeneration effect of the epidermis, in order to regenerate the tissue. Regarding keratolytics, they act on keratinocytes, with the function of increasing the keratinization of the epithelium. This type of drugs has the ability to soften the skin keratin, so that it detaches and allows cellular renewal. Keratolytic products use active ingredients that help hydrate/regenerate the corneal layer of the skin. These two types of drugs have similar dermatological purposes, differing in the mechanisms of action and the substances they use. Keratoplastic products make use of substances such as ammonium sulfoicthiolate, tar and sulfur. In case of keratolytic products, some used substances are, for instance, salicylic, retinoic, or glycolic acid, also known as keratolytic acids, which promote chemical exfoliation, the mechanism of action of the keratoplastic substances. These drugs are intended to be used on the body surface, in semi-solid forms that penetrate the epidermis, exerting action on the spot and removing impurities, allowing the healthy regeneration of the skin.

Keywords: Skin; Regeneration; Surface; Topical

DISINTEGRATION OF DRUGS

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Drug disintegration is the procedure by which a solid drug, such as a tablet or capsule, breaks down into smaller particles in the gastrointestinal tract before being absorbed by the body, so it is a crucial process in drug administration and absorption. Thus, the active ingredients of the drug are made available for consequent therapeutic action. This process can influence the speed and amount of active ingredient released into the body and it is through it that bioavailability, therapeutic consistency and patient safety can be assessed. In addition to influencing the properties described above, there are also some important factors that can interfere with its disintegration, such as: drug composition, pharmaceutical form, physiological conditions, temperature, pH, and manufacturing process. There are three mechanisms of disintegration: by disaggregation (breaking of bonds between the particles of the medicine), by erosion (wear of the medicine in contact with a fluid) and by dissolution (it dissolves in the gastrointestinal fluid). In order to understand the drug's ability to disintegrate in our body, it is necessary to resort to specific tests, such as in vitro disintegration tests and dissolution tests. Thus, these must be carried out with some suitable equipment: tablet dissolver, dissolving bath, agitators and centrifuges. By understanding the mechanisms and factors that influence disintegration, we can conclude that these two topics are fundamental to ensure drug quality and consistency.
However, improper disintegration can lead to insufficient absorption of the drug or even adverse reactions.

Keywords: Disintegration; Gastrointestinal fluid; Mechanisms of disintegration

HOMEOPATHY MEDICINES

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Homeopathy has the goal of restore physical health, emotional and mental, without the need to resort to chemical medicines, arising like this the homeopathy medicines who was created by Samuel Hahnemann.This medicines are obtained from substances named stocks or homeopathy raw-material, able to tease the same symptoms of certain diseases, stimulating like this the natural defense, the self-healing and consequently the restoration of the balance of the body following the principle “similar cures similar” This type of medicines can still be use has a unique medicine or has a complementary medicine to other diseases.

The production of this kind of medicines is carried out according to four principles, being them, The similar law, Experience in the wise man, Minimum doses and Unique medicine. Their principal routes of administration and consequently galenic formulas are predominantly the oral route, through globules, pills and liquids, topical route, through ointments and lotions, sublingual route, nasal route in nasal sprays and even the injectable route used in specific cases. The responsible authority to guarantee the quality and safety of homeopathy medicines is Infarmed.

Keywords: Homeopathy; Routes; Medicines; Principles

Discipline: Technology and Galenic Pharmacy I

Professor: Jorge Balteiro

Degree: Pharmacy

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Edition 21/2024

REVULSIVE MEDICINE

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Revulsive medicine,which can be found in different galenic forms , just as ointment, cream, may be topic or local.This drugs are capable of causing irritation or inflammation,since it direct blood circulation to the affected area, causing hyperemia, regenerating it.That effect is achieved by the action on responsible nerves by regulating the diameter of the capillaries.

Basically, these drugs promote an immune response, which leads to pain relief and treatment of inflammation. The Revulsive can be classified in two different ways, rubefacient and vesicant, the latter of which causes the formation of vesicles containing a liquid from the inflammatory reaction, but both cause hyperaemia. The Revulsive rubefacient is typically used to treat bronchitis, gastric congestion with vomiting,rheumatic pain, sprains and chronic inflammation. While the revulsive vesicants are used to monitor pain or intense inflation, such as pleurisy, pericarditis and sciatica. As they can cause side effects, medical advice is required before they can be sold. Some examples are: Local irritation; itching; allergic reactions; discomfort; redness and heat. When these symptoms are more severe it is advisable to seek professional assessment. Its action in reducing pain and treating inflammation is well recognised, so it's important to seek medical advice to ensure proper assessment and follow-up.

Keywords: Revulsive; Immune; Hyperaemia; Side effects

ATC CLASSIFICATION (ANATOMICAL THERAPEUTIC CHEMICAL CODE)

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The ATC classification is a connection with the pharmacotherapeutic classification. In this classification, the active substances are sectioned into different groups according to the organs or systems of their action therapeutic, pharmacologic, and chemical properties. The order number 6914/98 of 1998 March 24th, from the Secretary of State for Health was the first to approve the pharmacotherapeutic classification of medicine, to bring the official classification in Portugal to the ATC classification of the World Health Organization. The drugs are classified based on approved indications and therapeutic identities allowing healthcare professionals to identify these products more quickly and better tho achieve the intended treatment. This classification uses five levels, the first is designated based on the system or site of action of the drug, the second with the type of drug, considering its pharmacological action, the third is the therapeutic subgroup (more specific), the fourth refers to the chemical group that the drug contains, and finally, the fifth group lists the drug's active substances. As an example, paracetamol is classified as N02BE01. N, being level 1, indicates that it acts on the nervous system; 02 indicates that it is an analgesic; B indicates other analgesics and antipyretics; E indicates that it contains aniline; and 01 specifically indicates that it contains paracetamol (acetaminophen). The ATC classification plays a crucial role in the organization and understanding of medicines, facilitating more informed clinical practice for health professionals, establishing different levels according to certain physiological and chemical factors.

Keywords: ATC classification; Organization; Health professionals; Active substance; Pharmacotherapeutic classification

GASTRO-RESISTANT MEDICATIONS

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Gastro-resistant medications aim to protect the stomach, preserve pharmacological activity and avoid gastric irritation. They are coated with vegetable polymers, natural fibers or modified food starches resistant to stomach acid, which allows them to disintegrate only in the intestine. This ensures that the medicine is not absorbed in the stomach, but in the small intestine, providing resistance to the action of gastric juice. These medications are used in patients with stomach sensitivity or to protect certain medications from the action of stomach acids. The planning of enteric coatings considers the time it takes for the medicine to pass from the stomach to the intestines, taking into account the difference in pH between the two. This requires resistance to the acidic environment of the stomach and ease of dissolution in more basic environments, such as the intestine, to avoid loss of the pharmacological activity of the active ingredients. The dosage and administration of these medications differ from normal tablets, as they should not be chewed or divided, but rather taken whole, with water and one hour before meals. It is important to note that these medications may or may not require a prescription. Omeprazole, for example, is a gastro-resistant medication subject to medical prescription, widely used by the population due to its accessibility and low cost, but self-medication is common for these same reasons. Another example is pantoprazole, indicated to treat various gastrointestinal conditions and prevent injuries induced by medications such as non-steroidal anti-inflammatory drugs.

Keywords: Gastro-resistant; Protect; Time; Dissolution

DISINTEGRATING SUBSTANCES

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This paper examines the importance of disaggregating substances in the formulation of solid drugs. These substances play an important role in ensuring the rapid dissolution and absorption of drugs by the body, contributing to their therapeutic efficacy. Throughout the work, various aspects related to disaggregating substances were addressed, including their mechanisms of action, types, evaluation methods, regulatory considerations and clinical applications. The mechanisms of action of disaggregating substances involve breaking interparticle bonds, increasing the surface area of dissolution, reducing the mechanical strength of the tablet and hydrophilic properties. Different types of disaggregating substances, such as starch, microcrystalline cellulose and croscarmellose sodium, are widely used in the pharmaceutical industry due to their specific properties. Methods for assessing disintegration, such as disintegration and dissolution tests, are essential for guaranteeing the quality and efficacy of medicines. In addition, regulatory and pharmaceutical considerations, along with clinical applications in a variety of drugs, were discussed to highlight the importance of disaggregating substances in contemporary pharmaceutical practice. In short, disaggregants play an indispensable role in drug formulation, guaranteeing the therapeutic efficacy and safety of pharmaceutical products available on the market.

Keywords: Disaggregating substances; Mechanisms of action; Drugs; Therapeutic efficacy; Hydrophilic properties

Discipline: Technology and Galenic Pharmacy I

Professor: Jorge Balteiro

Degree: Pharmacy

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Edition 21/2024

INTRATHECAL ROUTE

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The aim of this study was to learn more about the intrathecal route, including all its advantages and disadvantages, precautions when using it and the possibility of any type of person being able to take advantage of this type of administration. We also talk about intrathecal chemotherapy, the intrathecal infusion pump, and finally a real case that used this type of route of administration with the aim of clinical improvement. This route stands out from other routes of administration, as it avoids the brain barrier, allowing drugs to pass from the blood to the CNS, leading to a more effective and safer administration. Intrathecal chemotherapy is intended for people suffering from cancer, where chemotherapy drugs are administered into the cerebrospinal fluid via the Ommaya reservoir. The intrathecal infusion pump is a method used for patients with cancer pain, where it pain becomes more and more intense depending on the type of tumor and where it is located. The real case being discussed is about a boy who has been diagnosed with Autism Spectrum Disorder (ASD). Although there is currently no known cure, in 2016 there was a study involving the intrathecal injection of his own umbilical cord stem cells to treat ASD. The conclusions we were able to draw were that there were significant improvements after just two injections. In conclusion, it can be seen that this route provides a very effective degree of improvement, and also stands out for its high speed of achieving the expected effect due to its administration in the subarachnoid space.

Keywords: Intrathecal route; Injection; Hematoencephalic; Barrier; Efficiency

INTRAPERITONEAL ROUTE

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With the advancement of technology and new knowledge, various fields have experienced significant progress, particularly in medicine, where treatments increasingly adapt to pathologies more effectively. In this context, the work aims to present the intraperitoneal route, which is a specific route used for the administration of medications through the peritoneal cavity. In this regard, the route is typically used for performing dialysis or chemotherapy in veterinary medicine and is gaining relevance in human medicine. The peritoneal route administers medication through the peritoneal cavity, which is a serous membrane with a double wall. The first known mention of this structure was in the Ebers Papyrus. The english surgeon, Christopher Warrick, idealized the possibility of the peritoneal cavity being used as a route for administration of medicaments, and practical studies began in 1877 by the german G. Wegner. Over the years of study, this route became established as a reliable and safe route for administration between 1924-1938. In addition to being used in the treatment of peritoneal tumors, this route is commonly used for chemotherapy and peritoneal dialysis. The medication circulates around the peritoneal tissue and then into the bloodstream. The transport of the medication occurs through tree simultaneous processes: diffusion, ultrafiltration and fluid reabsorption. The absorption is maximized in the cavity due to its rich vascularization and large surface area. In conclusion, this route stands out for the systemic administration of medications with rapid absorption, being approached as a relevant therapeutic option for certain treatments.

Keywords: Dialysis; Peritoneal; Medication; Chemotherapy; Therapeutic

Discipline: Public Health

Professor: Cristina Santos

Degree: Environmental Health

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Edition 21/2024

PROMOTION OF HEALTHY LIFESTYLES

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The promotion of healthy lifestyles has been a crucial area for public health, encouraging habits that contribute to the physical and mental well-being of the population.

The general aim of this work was to promote healthy lifestyles, find out about the healthy lifestyles of the general population and disseminate relevant information on the subject.

The methodology adopted was a literature review on the subject and the application of a questionnaire to the general population.

Based on the data obtained from a questionnaire applied to 125 people, it was observed that the majority practiced physical activity 1-2 times a week. This habit brings benefits such as disease prevention, well-being, combating depression and weight control. Only 7.1% of the sample does not practice physical activity. As for other habits, such as smoking and illicit substances, 69.8% and 82.5% of respondents said they had never used them. While the occasional consumption of alcoholic beverages was noted by 37.3%, and the use of contraceptive methods is used very frequently by 43.7% and never by 30.2%.

About the sleep time, only 28% sleep 7 to 8 hours, below the recommendation of 7 to 9 hours a day for good health. Lack of sleep can lead to problems such as insomnia, which in turn causes memory failures, excessive tiredness, ageing, stress and emotional instability.

This work has demonstrated the importance of promoting healthy lifestyles as a fundamental strategy for promoting public health. By promoting healthy habits and disseminating relevant information about this theme, we hope to contribute to disease prevention and to increasing the population's quality of life.

Keywords: Styles, promotion, habits, population, health

CLIMATE CHANGE AND HEALTH

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Public Health is the science of the epidemiological view of health and disease. It focuses on the study of social, economic, educational and environmental factors that can lead to pathology. Climate change refers to long-term changes in the Earth's weather patterns. This includes the rise in global average temperature, changes in precipitation patterns, rising sea levels and other climate-related changes. These changes are mainly attributed to human activities. Today, climate change remains a significant global concern. The aim of this work was to raise awareness and alert the population to the behaviours they should adopt in order to minimize the impacts of climate change. This study used news research, websites and a questionnaire to analyze knowledge about climate change and its consequences and the relationship with public health. The results obtained from the questionnaire showed that most people know what climate change is and say that climate change is of both natural and human origin. Most of the participants only had secondary education, but the entire sample confirmed that they believe in climate change. It is therefore necessary to continue promoting the need to adopt behaviors that help reduce the impacts of climate change, so that these actions improve the planet.

Keywords: Keywords: Impacts, Climate change, Public Health, Behavior

AGING AND PUBLIC HEALTH

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Population aging is a new growing trend today. This reality generates a series of complex and serious consequences for Portuguese society. Consequently, this causes an increasing need for health services, followed by a lack of material and human resources.

This work consisted of a population analysis regarding aging, a crucial concern of the 21st century, and the current problems related to the topic, such as accessibility, the priority of these in essential establishments (markets, hospitals, among others).

The study involved research, collection of data on public health and aging, interpretation of results and development of intervention strategies, culminating in the preparation of a final report with preventive measures.

A questionnaire was carried out with a majority of responses where the majority were concerned about the aging of the population (98,7%) and disagreed with current health care measures for the elderly (97,2%), with a compromise between the availability of information on the topic in question. There was a predominance in the results obtained that the lack of systems suitable for people of advanced ages is visible. The questionnaire ended with suggestions for improvement from respondents such as more holistic support, better medical care and more accessible information, among others.

As life expectancy increases, it is essential to prioritize policies and programs that promote healthy and active aging, addressing issues such as disease prevention, access to adequate healthcare, promotion of healthy lifestyles and ensuring social and emotional support for the elderly.

Keywords: aging; public; health; strategies; improvement

PRIMARY HEALTH CARE

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Primary health care is a whole-of-society approach to health and well-being, centred on the needs and preferences of individuals, families and communities. These address the broader determinants of health and focus on the complete and interrelated aspects of physical, mental and social health and well-being, to ensure accessible, continuous and complete care for health needs throughout an individual's life. However, as we know, there are challenges and adversities associated with the healthcare system. One of the main problems is limited access, due to a lack of health professionals, inadequate infrastructure or economic barriers that make it difficult for the population to access services. Other challenges are based on socioeconomic and geographical disparities that can result in inequalities in access to primary health care and also on the work overload of primary health professionals, as high demand for services can lead to burnout and compromise the quality of care. To better understand the subject, we opted to carry out a questionnaire, in which we can see that we should give more value to health in general, as it is an important and fundamental parameter for society, and that the interaction of primary health care and epidemiological surveillance, despite its problems, help to prevent diseases, They also contribute to reducing health inequalities and strengthening health systems as a whole.

Keywords: primary health, epidemiological surveillance, problems , health systems

Discipline: Public Health

Professor: Cristina Santos

Degree: Environmental Health

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Edition 21/2024

FOOD SECURITY IN YOUNG UNIVERSITY STUDENTS

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This paperwork addresses the concern about food insecurity among Portuguese young adults, specifically university students, highlighting that one in nine faces this situation, which is defined as limited or uncertain access to nutritionally adequate and safe food, due to economic reasons, among others. This studyk also highlights the "Five Keys to Safer Food" as essential measures to prevent foodborne diseases, emphasizing the need for good practices in food handling, highlighting the growing association, with programs such as the "Promotion of Healthy Eating" being prioritized by the Directorate-General of Health of Portugal. The PNPAS (National Programme for the Promotion of Healthy Eating) is mentioned as a national strategy to ensure the food security of the Portuguese population, with three priority areas of intervention defined. The objectives of the work are clear: to evaluate the eating behavior of university students, to understand the risks they face due to their food choices (whether due to lack of money or time) and to propose preventive measures to promote the health and well-being of these individuals. The methodology adopted involves a small approach to the theme, review of scientific articles and the application of a questionnaire. It seeks to obtain information about the type of diet and lifestyle habits of students, aiming to identify those who may be fighting food insecurity and need support. In addition, it seeks to promote awareness and discussion about the importance of food security and adequate nutrition within the university community. We can see that although today's young people have an idea of what food security is, it is up to educational establishments to raise awareness about the topic.

Keywords: promotion , security , prevent , habits

INAPPROPRIATE USE OF MEDICATION AMONG THE ELDERLY IN A COMMUNITY CENTRE IN COIMBRA

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Introduction: Polypharmacy and potentially inappropriate prescriptions pose an increased risk in elderly populations. These are directly related to an increase in falls, adverse reactions, hospital admissions, and sometimes death. It is therefore essential to minimize these risks. This issue has been discussed recently, and several strategies have been developed to assess prescriptions and polymedication. These, although limited, have proven to be safe and effective.
Objective: This study's primary aim is the analysis of the profile of medication usage in the elderly, and potential inappropriate use according to the STOPP/START criteria.
Methods: An observational study will be carried out on a sample of users of a Community Center in Coimbra, aged over 60 and polymedicated. Potentially inappropriate medications (PIMs-STOPP) and possible prescription omissions (PPOs-START) will be identified according to STOPP/START version 3 criteria.
Results: It is expected to find individuals with a high average daily consumption of prescription drugs, thus enabling the identification of potentially unsuitable drugs for the elderly. The outcome of this could be adverse reactions and a reduction in the quality of life of the elderly.
Conclusion: It is recommended to avoid excessive consumption of medication, and to promote cautious use and dose reduction. As well as, sharing knowledge about the assessment of elderly people's medication, doctor/patient communication and pharmacotherapeutic monitoring could help to increase the quality of life of the elderly.

Keywords: Pharmacotherapeutic profile, Polymedication, STOPP/STRAT criteria, Inappropriate prescription

THE USE OF NOOTROPICS IN ALZHEIMER'S DISEASE

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Introduction: Alzheimer's disease is a progressive neurodegenerative disorder characterized by cognitive decline, memory loss, and impaired daily functioning. As the global population ages, the prevalence of Alzheimer's disease continues to rise, posing significant challenges to healthcare systems worldwide.
Nootropics are substances used to enhance cognitive functions, such as memory and learning, and, additionally, to improve creativity and even increase motivation.
Objective: The main objective of this review study is to describe the state of the art regarding the therapeutical use of nootropics in different stages of the Alzheimer's disease.
Methods: A bibliographical search was carried out in different databases including "Pubmed", "Google Scholar" and "Scielo", using keywords such as "Alzheimer" OR "Mild cognitive impairment" AND "Nootropic drugs"
Development: Since nootropics may be used as cognitive enhancers, one of their therapeutic indications are chronic diseases, especially cognitive dysfunctions, such as Alzheimer's disease. Nootropics can act as neuroprotectors, helping to reduce the accumulation of beta-amyloid protein (one of the main biomarkers of Alzheimer´s disease), synaptic dysfunction, inflammation, apoptosis, and oxidative stress. Some nootropic agents, such as Centella asiatica and Ginseng (naturally occurring), and nicergoline and dihydroergotoxine (synthetic) are a few examples of nootropics already tested in Alzheimer's patients.
Conclusion: It is of relevance to continue investigating the potential benefits and risks of using nootropics in early-stage Alzheimer or in other stages of Alzheimer's disease.

Keywords: "Alzheimer", "Mild cognitive impairment", "Nootropic drugs"

Discipline: Applied Research in Pharmacy

Professor: Rui Cruz

Degree: Pharmacy

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Edition 21/2024

DERMATOLOGICAL CARE FOR SKIN UNDERGOING CANCER TREATMENT

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The World Health Organisation defines cancer as a group of diseases characterised by the uncontrolled growth of cells. Risk factos in Portugal include alcohol, tobacco, excesso weight and physical inactivity, highlighting the importance of early diagnosis for a favourable prognosis. Treatments vary, resulting in various adverse effects, particularly on the skin, such as dryness, hyperpigmentation, hand-foot syndrome, sensitivity to light and itching. They require care before, during and after treatments. This includes hygiene, moisturising and sun protection. Careful choice of dermatological products is essential to minimise the adverse effects of treatments. Corrective make-up can help improve patients' quality of life by concealing certain skin alterations.
A bibliographic search was carried out in different databases including Pubmed and google scholar, official entities such as the World Health Organisation, the National Health Service and the library of the Escola Superior Tecnologia da Saúde de Coimbra. Using keywords such as cancer, cosmetics, skin care, dermatology, quality of life, cancer treatments. The research was carried out taking into account a study period of the last 5 years.
This literature review aims to understand the skin changes inherent in cancer, the drugs that potentiate them and to explore existing dermatological care.
The promotion of well-being and adherence to treatment are facilitated by a careful approach to the choice of cosmetic and dermatological products.

Keywords: cancer, skin care, dermatology, quality of life, cancer treatments

OTOXICITY AND WAYS TO CONTROL ITS PROGRESSION

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Hearing loss often impairs people's well-being, leading to social isolation, loneliness, and depression. It is often impossible to reverse. That's why it's necessary to know the possible factors that cause it, to slow down this loss.

The cause of hearing loss can be congenital or acquired. Congenital causes are the result of hereditary or environmental factors. Acquired deafness, on the other hand, can result from exposure of the inner ear to noise, advancing age, infections of the hearing system and the adverse effects of medication. Ototoxic drugs are an important factor in inducing hearing loss, causing damage to or impairment of the function of hair cells, which play a critical role in transducing sound into electrical stimuli.

Ototoxic drugs are mainly antibiotics from the aminoglycoside family (streptomycin, gentamicin, neomycin...), antineoplastics (cisplatin) and less often, non-steroidal anti-inflammatory drugs.

Various clinical situations can lead to greater susceptibility to hearing loss induced by these drugs, as well as various polymorphisms in the mitochondrial rRNA and nuclear genome.

The aims of this study are to understand how ototoxic drugs act, leading to hearing loss, and to investigate the otoprotective strategies that have already been proposed and those that are in the development phase, as well as their implications.

Keywords: “ototoxicity drugs”; “mtDNA” ; “otoprotective strategies”