POSTER WEEK

Poster Week 24/2025

ABSTRACT BOOK

November 2025
10th–14th

estesc

PEDAGOGICAL-SCIENTIFIC COMITEE

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ABSTRACTS

EFFECTS AND DOSES OF MELATONIN ACROSS DIFFERENT AGE GROUPS: A REVIEW OF THE SCIENTIFIC EVIDENCE

Bruna Pinto; Marina Pintea; Rita Lacerda

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Introduction: Melatonin is an endogenous hormone produced by the pineal gland, responsible for regulating circadian rhythms. Beyond its chronobiological role, it also exhibits antioxidant and anti inflammatory properties.
Objective: This review aimed to identify the different doses of melatonin administered across various age groups and possible adverse effects.
Methodology: The search was conducted in the PubMed and ScienceDirect databases, including articles within the last 10 years with the keywords melatonin, dose, food, and sleep. Were included 25 scientific articles according with the research's aims.
Results/Discussion: The analysis revealed variations in melatonin dosage influenced by age and individual metabolism. In children and adolescents, the most common doses ranged from 0.5-5 mg/day, usually adjusted for body mass index. In adults, doses between 1-5 mg improved sleep latency and quality, while in the elderly, doses from 2-10 mg demonstrated efficacy and safety. Doses exceeding 10 mg/day did not appear to provide additional benefits and were associated with dizziness and drowsiness. Melatonin supplementation also showed benefits in metabolic, cardiovascular, and gastrointestinal disorders, with doses between 3-10 mg/day. Additionally, melatonin-rich foods such as cherries and dairy products may contribute to improved sleep, although the optimal dietary dose remains undefined. Overall, melatonin effectiveness depends on the timing of administration and the formulation, in alignment with circadian rhythm. Thus, dietary melatonin may act as a natural physiological modulator, while supplementation should be individualized and monitored to avoid prolonged use of high doses.
Conclusion: More studies are needed to consolidate the scientific evidence.

Keywords: Melatonin; Dose; Age groups; Adverse effects.

TRICHOTHECENES: TOXICOLOGICAL IMPACT AND FOOD CONTAMINATION RISKS IN HUMANS

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Introduction: Trichothecenes are mycotoxins produced by fungi of the Fusarium genus, commonly found in agricultural environments. These chemicals are known for their toxicity and can negatively affect both human and animal health.
Objectives: The main objective of this research is to characterize trichothecenes, analyze their impact on human health and their relationship with food contamination.
Methods: A literature review was conducted using the PubMed and Science Direct databases, with the search terms "trichothecenes", "food contamination", "toxins", "humans" and "public health". Only articles published within the last 10 years were considered. After screening titles and abstracts, 25 articles were selected and analyzed in full.
Results: The analysis of scientific literature reveals that deoxynivalenol (DON) is one of the mycotoxins from the trichothecene group most frequently detected in cereals such as wheat, corn, barley and oats. DON is heat-stable and resistant to food processing. Studies indicate that it mainly acts by inhibition of protein synthesis and activation of inflammatory pathways, leading to oxidative stress, cellular apoptosis and an exacerbated immune response.
In humans, these mechanisms result in gastrointestinal symptoms, immunosuppression, genotoxicity and organ damage.
Although significant transfer of this toxin to animal products (meat, milk, eggs) is limited, the main route of human exposure is through the direct consumption of contaminated cereals.
Conclusion: Deoxynivalenol represents a major threat to food safety due to its widespread occurrence and high toxicity, which affects several physiological systems. Preventing exposure requires strict monitoring of mycotoxin levels, compliance with regulatory limits and adoption of good agricultural and storage practices to ensure food quality and safety.

Keywords: Trichothecenes; Toxins; Food Contamination; Public Health; Human

HISTAMINE AS A FOODBORNE HAZARD: INSIGHTS INTO CONTAMINATION, TOXICITY, AND PREVENTION

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Background: Histamine is a biogenic amine produced by the decarboxylation of the amino acid histidine, a process that may occur under inadequate storage or handling conditions. Food of animal origin, particularly fish, cheese, and fermented products, are the most common sources.
Aim: Identify the impact of histamine on human health and the main food sources associated with its contamination.
Methods: A literature review was conducted in the PubMed® and ScienceDirect® databases, covering studies published within the last ten years. The search used the keywords “histamine,” “contamination,” “food,” and “fish.” Out of 76 articles retrieved, 28 met the inclusion criteria and were analysed.
Results: Histamine intoxication typically manifests within 10–60 minutes after ingestion, causing symptoms such as flushing of the face and neck, diarrhoea, urticaria, headache, nausea, and vomiting. These effects result from the interaction of histamine with H1 and H2 receptors, leading to vasodilation and stimulation of sensory nerves. Symptom severity varies with the ingested dose and individual sensitivity. Preventive measures include maintaining the cold chain, minimizing exposure to ambient temperatures, and ensuring strict hygiene practices during food processing and storage. Histamine contamination represents an important toxicological hazard. Strengthening food safety controls, promoting public awareness, and enforcing good manufacturing and handling practices are essential to prevent histamine-related foodborne intoxications.
Conclusion: The aims were successfully achieved.

Keywords: Public Health, Toxicology, Food, Contamination, Histamine.

HETEROCYCLIC AMINES

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Introduction: Heterocyclic amines (HCAs) are toxic and mutagenic compounds generated during the thermal processing of protein-rich foods, particularly meats subjected to grilling, frying, or roasting. Their presence in the human diet has raised increasing concern due to their potential carcinogenicity.

Objective: This study aimed to conduct a comprehensive literature review to characterize HCAs, evaluate their toxicological and carcinogenic potential, and explore their interactions with food matrices.

Methodology: A systematic search was carried in the ScienceDirect and PubMed databases using the keywords “heterocyclic amines,” “mutagenic,” “carcinogenesis,” “toxicology,” and “thermal processing.” The search was restricted to the last five years, yielding 146 articles. After removing duplicates and applying inclusion criteria, 25 studies were selected for detailed analysis.

Results and Discussion: HCAs are primarily formed through Maillard-type reactions involving amino acids, creatine, and reducing sugars. Their generation increases with prolonged cooking times and temperatures above 150 °C. The most frequently reported HCAs include PhIP, MeIQx, and IQ, which undergo hepatic biotransformation into reactive metabolites capable of forming DNA adducts and inducing mutagenic events associated with colorectal, hepatic, gastric, and breast carcinogenesis. No safe exposure threshold has been established. Mitigation strategies such as the use of antioxidant-rich marinades and optimization of cooking time–temperature parameters have shown promise in reducing HCA formation. These findings highlight HCAs as a critical concern in food toxicology, underscoring the need for preventive measures and the development of predictive tools based on the time–temperature relationship to minimize dietary exposure.

Conclusion: The review achieved its objectives.

Keywords: “heterocyclic amines,” “mutagenic,” “carcinogenesis,” “toxicology,” and “thermal processing.”

LITERATURE REVIEW: HEALTH EFFECTS OF ASHWAGANDHA

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Background: Withania somnifera (Ashwagandha) is an adaptogenic herb long used in Ayurvedic medicine and increasingly applied in clinical nutrition and functional foods. Its bioactive compounds, mainly withanolides, have been associated with diverse therapeutic effects.
Aim: Study the chemical composition, biological activities, clinical evidence, and safety profile of Ashwagandha, with a particular focus on its role in functional food applications.
Methods: A comprehensive literature search was performed in the PubMed® and ScienceDirect® databases using the keywords “ashwagandha,” “withania somnifera,” “supplements,” “health,” and “effects.” The search covered the last five years, identifying 528 publications, of which 25 met the inclusion criteria for detailed analysis.
Results: Evidence shows that Ashwagandha supplementation significantly reduces cortisol levels and pro-inflammatory cytokines while enhancing antioxidant enzyme activity and immune function. Reported clinical benefits include reduced stress and anxiety, improved sleep and cognitive performance, enhanced muscle strength, and better regulation of glucose and lipid metabolism. Effective daily doses range between 250–600 mg of standardized root extract, with good tolerability up to 1000 mg/day. Withanolides modulate pathways such as NF-κB and MAPK, contributing to anti-inflammatory, anticancer, and antiviral effects, including potential activity against SARS-CoV-2. Although generally safe, rare cases of hepatotoxicity have been documented. Even though there are various scientific evidence pointing to the therapeutic effects, safety concerns and its mechanisms have yet to remain under investigation.
Conclusion: Our objective has been achieved and validated through scientific evidence. Ashwagandha demonstrates validated benefits with a favourable safety profile. Its incorporation into functional foods offers promising applications under clinical supervision.

Keywords: Ashwagandha, withania somnifera, supplements, health, effects.

ACRYLAMIDE

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Introduction: Acrylamide is a chemical compound formed in carbohydrate-rich foods when exposed to high temperatures, primarily through the Maillard reaction between asparagine and reducing sugars. Although it contributes to desirable sensory characteristics such as color and flavor, its detection in foods has raised major concerns due to its potential carcinogenic and neurotoxic effects, making it a central topic in food safety research.

Objectives: This study aimed to review and synthesize recent scientific evidence on the mechanisms of acrylamide formation, its toxicological effects, and the mitigation strategies applied to processed foods.

Methodology: A bibliographic search was conducted in the PubMed and ScienceDirect databases using the keywords “Maillard reaction,” “food,” “health,” and “acrylamide.” Publications from 2024 to 2025 were considered to ensure scientific relevance and up-todate information. A total of 644 articles were identified; after title screening, 42 were selected, followed by 29 after abstract review, resulting in 11 articles included for full-text analysis.

Discussion and Results: Acrylamide formation depends on factors such as temperature, cooking time, pH, moisture, and the composition of the food matrix. The highest concentrations are found in fried potatoes, bakery products, and coffee. The most effective mitigation strategies include the use of enzymes (asparaginase), formulation modifications, and the optimization of thermal parameters, while preserving sensory quality.

Conclusion: Despite scientific and regulatory progress, acrylamide remains a potential public health risk. Its effective reduction requires an integrated approach that combines technological innovation, industrial responsibility, and ongoing research to ensure safe and high-quality food products.

Keywords: “Acrylamide”; “Health”; “Food”; “Maillard Reaction”

N-NITROSAMINES IN FOOD: TOXICITY, EXPOSURE, AND MITIGATION STRATEGIES

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Introduction: N-nitrosamines are formed by reactions between amines and nitrates, occurring endogenously in the gastrointestinal tract and exogenously during food processing and preparation. The presence of N-nitrosamines in food matrices poses a significant risk to public health due to their high mutagenic and carcinogenic potential.
Objective: To identify which foods contain nitrosamines and their health risks, and to suggest practical ways to reduce exposure.
Methodology: The research was based on a comprehensive analysis of 10 articles in PubMed and 15 articles in Science Direct.
Results: N-nitrosamines are a class of chemical compounds recognized as carcinogenic, whose exposure has been associated with carcinogenesis in organs such as the liver, stomach, and esophagus. Both nitrosamines and their precursors are present in consumer products such as cured and processed meats and some vegetables stored with nitrite-based preservatives.
The European Food Safety Authority (EFSA) has established strict tolerable daily intake (TDI) limits due to their high toxicity, at 10 µg/kg of body weight per day. The main strategies for limiting the presence of nitrosamines are: the application of antioxidants such as ascorbic acid, which inhibit the formation of these compounds, the control of thermal parameters during processing, and the establishment of monitoring programs throughout the production chain.
Conclusion: The objective was achieved, identifying the main dietary sources of N-nitrosamines and their health risks. Reducing the consumption of processed foods, the use of antioxidants, and thermal control are effective strategies to decrease exposure and promote food safety.

Keywords: Nitrosamines, toxicology, processed foods, prevention diet, food safety, Carcinogenesis

POLYSTYRENE IN THE FOOD CHAIN: ASSESSING TOXICITY, HUMAN HEALTH RISKS, AND MICROPLASTIC EXPOSURE

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Background: Polystyrene is a synthetic polymer produced by the polymerization of styrene monomers. Due to its durability and low cost, it is extensively used in food packaging, containers, and disposable utensils. However, its migration into food and subsequent ingestion in the form of micro- and nanoplastics has raised growing concerns about its impact on human health and the environment.

Aim: Identify the toxicological effects of polystyrene exposure on human health and its relevance within the food chain.

Methods: A literature review was conducted in the PubMed® and ScienceDirect® databases, covering the period from 2023 to 2025. The following keywords were used: “styrene food contamination,” “polystyrene food contact materials,” “styrene migration limit EU,” “styrene genotoxicity,” and “food packaging safety styrene outbreak.” From 236 identified articles, those meeting the inclusion criteria related to food contact and toxicological impact were selected for analysis.

Results: Evidence indicates that exposure to polystyrene, particularly in micro- and nanoplastic forms, can lead to gastrointestinal dysfunction, alterations of the gut microbiome, oxidative stress, genotoxicity, metabolic disturbances, and inflammation. Migration of polystyrene-derived particles from packaging into food constitutes a major public health concern. The polystyrene contamination in the food chain poses significant toxicological and environmental risks. The findings emphasize the urgent need for preventive measures, including the development of alternative packaging materials, stricter regulatory frameworks, and the promotion of sustainable food packaging practices.

Conclusion: After analyzing the articles, it was possible to identify toxic effects of polystyrene on human health and on the food chain, through food contamination caused by the migration of the packaging material. Based on this observation, it can be confirmed that the study achieved its objectives.

Keywords: Public Health, Toxicity, Food, Microplastics, Polystyrene

DIETARY EXPOSURE TO PFAS: A REVIEW OF FOOD CONTAMINATION AND ASSOCIATED HEALTH RISKS

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PFAS (perfluoroalkyl and polyfluoroalkyl substances) are commonly referred to as “forever chemicals” since they are highly persistent and accumulate in the environment, food and soil , and have a remarkable resistance to water, grease, heat, and stains. They are widely used in commercial products to provide waterproof, nonstick, and stain-resistant properties and can be found in nonstick cookware, food packaging, cosmetics, firefighting foams, and certain clothing.
This research examines the relationship between PFAS and food, as well as their adverse effects on human health along with preventive measures. The research was made through a literature review, using PubMed and ScienceDirect, with the following keywords “PFAS; Health; Cancer; Exposure; Toxicity” and “PFAS; Health; Food consumption; Human; Contamination; Europe” supplemented by freely available articles.
It can be present directly in food, such as fish and shellfish, in animals exposed to contaminated feed, including poultry and livestock, and even in vegetables or drinking water. Indirect exposure occurs through migration from food packaging and utensils. Diets high in fat are associated with higher PFAS exposure. Human contact with PFAS has been linked to cancer, fertility issues, asthma, inflammatory bowel disease, allergies, reduced birth weight, and thyroid dysfunction.
This research was unable to achieve all of the proposed objectives, due to the lack of information about preventive measures and scarcity of scientific literature about the correlation between diet and PFAS.

Keywords: PFAS; Food; Human

MICROCYSTIN TOXICITY: IMPACTS ON HUMAN HEALTH AND THE FOOD CHAIN

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Introduction: Microcystins (MCs) are cyclic hepatotoxins produced by various freshwater cyanobacteria known as blue-green algae. They are a class of cyclic heptapeptides. The most studied form is microcystin leucine-arginine, which is the most common and harmful since it is an extremely acute toxin.
Objectives: To understand their toxicity and how they interact with food in exposed organisms or any environment susceptible to contamination.
Methodology: Research in two scientific databases (PubMed and ScienceDirect), according to the established keywords (microcystins, contamination, algae, toxic, food), filtered with a time interval of 10 years and rigorous selection according to the information most relevant to the investigation.
Discussion/Results: The liver is the main target organ for microcystins, as they are stored there, but other organs can also be affected, such as the heart, nervous system, kidneys, and gastrointestinal tract. Ingestion of contaminated food can lead to oxidative stress, damage to kidney function, liver inflammation, DNA damage, cell apoptosis, and evidence of carcinogenicity. There is evidence that flavonoid consumption may have a protective effect against the hepatotoxicity of leucine-arginine microcystins. The main routes of exposure to MCs are the ingestion of contaminated water and contaminated foods such as fish and mussels, causing microcystins to persist in the food chain and threaten human health. Thus, the World Health Organization has declared a safety limit of 1 µg/L in water for human consumption and for total daily consumption of 0.04 µg/kg of body weight.
Conclusion:MC affects both marine animals and humans and must be studied to avoid its toxicity.

Keywords: Microcystins, contamination, toxic, food, public health

POLYPHARMACY

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Polypharmacy, defined as the simultaneous use of five or more medications, is a phenomenon that is increasingly prevalent, particularly among elderly patients and those with multiple chronic conditions. This trend is driven by population aging and the higher prevalence of chronic diseases. Although often necessary for therapeutic management, polypharmacy carries significant risks, including drug interactions and adverse reactions, which can compromise treatment efficacy and safety. Preventing these effects requires frequent treatment re-evaluation, patient education, and continuous pharmaceutical monitoring. Pharmacists therefore play a crucial role in promoting the rational use of medications and ensuring therapeutic safety.

Keywords: Polypharmacy; Drug interactions; Adverse reactions; Pharmacist; Rational use of medication.

SELF-MEDICATION

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Self-medication is defined as the practice of taking medication on one's own without medical advice. Although it may seem harmless, self-medication can be dangerous when done without proper precautions. This habit arises for several reasons: easy access to medicines, the influence of the internet and advertising, previous experiences, advice from friends or family, and the desire to quickly relieve unwanted symptoms. The main problem lies in the fact that most people are unaware of the risks and potential adverse effects associated with the use of medicines. The main dangers of self-medication include adverse reactions, drug interactions, bacterial resistance, especially through the misuse of antibiotics, delayed diagnosis of serious illnesses, poisoning and the worsening of chronic diseases. Nevertheless, when done conscientiously and responsibly, it can have benefits, such as rapid relief from mild symptoms, such as pain or fever, greater autonomy, and reduced burden on the healthcare system. To prevent the associated risks, it is essential to take preventive measures such as seeking advice from a pharmacist, reading the package leaflet carefully before using any medicine, avoiding the use of old prescriptions, respecting prescription medicines and promoting education on the rational use of medicines. Examples of inappropriate self-medication include the misuse of antibiotics, the abuse of painkillers, and the consumption of over-the-counter sedatives. In Portugal, studies show that many people still self-medicate, especially to treat pain and colds. In short, self-medication can be useful in simple cases, but dangerous when done without information or responsibility. The key is to find a balance, seeking guidance from health professionals and recognizing that sometimes an apparently immediate solution can aggravate the situation instead of resolving it.

Keywords: Self-medication; Risks; Adverse effects; Responsibility

NATIONAL VACCINATION PROGRAM

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Vaccines play an essential role in preventing serious diseases. In Portugal, the National Vaccination Program (PNV), created in 1965 and coordinated by the National Health Service (SNS), ensures universal and free access to recommended vaccines, protecting the entire population, regardless of nationality or social status. The main goal of the PNV is to protect people against infectious diseases, reducing mortality and promoting herd immunity. Over the years, the program has proven extremely effective, eliminating and controlling various diseases through the use of safe and scientifically validated vaccines. The PNV is universal, covering all residents in Portugal, including foreigners and individuals under temporary protection. Key updates include the introduction of the Meningococcal B vaccine, the extension of the HPV vaccine to boys, the replacement of Prevenar 13 with Prevenar 20, and the integration of community pharmacies as vaccination posts. Vaccines are administered from birth through adulthood, with periodic boosters throughout life and special vaccination during pregnancy. The vaccines included in the PNV are selected based on criteria such as disease severity, efficacy, and public health safety. Vaccination can be carried out in health centers, family units, temporary centers, and pharmacies. The PNV is an essential measure for disease prevention and public health promotion, contributing to a healthier and safer future for the entire population.

Keywords: Vaccination; Public health; Universal access; Immunity

GENERIC DRUGS

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Generic drugs produced after the expiration of the patent of a reference (original) medicine. They contain the same active substance, dosage, pharmaceutical form, and route of administration as the reference medicine and are bioequivalent to it. Bioequivalence ensures that the generic medicine has the same therapeutic effect in the body. The main advantage of generic medicines is their significantly lower cost compared to brand-name medicines. This price reduction is due to the fact that generic manufacturers do not need to invest in research and development (R&D) or extensive clinical trials, since these have already been conducted by the manufacturer of the reference medicine. In Portugal, the marketing of generic medicines is regulated by INFARMED, the National Authority of Medicines and Health Products, I.P., which ensures that all generics available on the market meet the same standards of quality, safety, and efficacy as reference medicines. The packaging of generics in Portugal is identified by a yellow stripe with the label "Medicamento Genérico" (Generic Medicine) or by the initials “MG.” The use of generic medicines contributes to the sustainability of the healthcare system by allowing access to effective treatments at a lower cost, thus freeing up resources for other areas of healthcare. It is essential that healthcare professionals play an active role in educating patients, clarifying doubts, and promoting the informed use of generics.

Keywords: Generic drugs; Bioequivalence; Advantage; Health professionals

PLACEBO EFFECT OF MEDICATIONS

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The placebo effect is a positive response of the body that occurs when a person believes they are receiving an effective treatment, even though it contains no active substance. The term “placebo” comes from the Latin word placere, meaning “to please.” In the field of health, it refers to medications or procedures without active ingredients that nevertheless produce a sense of well-being and symptom improvement, demonstrating the power of the mind over the body. This effect triggers both psychological and physiological mechanisms. Physiologically, it stimulates the release of endorphins and the activation of brain areas related to pleasure, leading to pain reduction and mood improvement. Psychologically, expectation plays a central role, as belief in the treatment’s effectiveness prompts real physiological responses in the brain. In clinical trials, the use of placebos is essential to determine whether the effects of a new drug are real (specific) or merely the result of the patient’s belief. However, their use raises ethical concerns and is only acceptable under specific conditions: when no effective treatment exists, when informed consent is obtained, and when there is no significant risk to the participant. In conclusion, the placebo effect is highly important in both health and scientific research, as it helps to understand the crucial role of the brain in certain treatments.

Keywords: Placebo effect; Mind–body connection; Clinical trials; Psychological mechanisms; Ethical issues.

PORTUGUESE PHARMACOPOEIA

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The Portuguese Pharmacopoeia is a normative reference instrument with legal value that defines the standards of quality, safety, and efficacy for medicines marketed and used in the country. Beyond its regulatory role, it plays an important part in the training of healthcare professionals — especially pharmacists, physicians, and chemists — by providing rigorous technical content that supports clinical, laboratory, and industrial practice. Its origins date back to the 18th century, with the publication of Pharmacopea Lusitana in 1704. However, it was only in 1794 that the first official national pharmacopoeia, the Pharmacopoeia Geral, was approved by Queen Maria I. Currently, the ninth edition of the Portuguese Pharmacopoeia (since 2021) is in force, published by INFARMED, I.P., in a single volume containing detailed monographs on active substances, excipients, and pharmaceutical forms. Its preparation and revision are overseen by the Portuguese Pharmacopoeia Commission, an advisory body to INFARMED, composed of voting members and specialized experts. The pharmacopoeia must be present in pharmacies, laboratories, universities, the pharmaceutical industry, and technical libraries, ensuring compliance with legal and technical standards. Portugal actively contributes to European Pharmacopoeia, adopting its standards and analytical methods. This integration harmonizes quality criteria across European countries, enhancing treatment safety and facilitating medicine circulation.

The ongoing updates to the Portuguese Pharmacopoeia reflect the national commitment to scientific excellence and public health, symbolizing the ethical and technical responsibility of the pharmaceutical profession.

Keywords: Pharmacopoeia; Assurance; Quality; Medicines; INFARMED.

CLINICAL TRIALS

Mariana Nobre; Rute Faria

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Clinical trials are scientific studies conducted in humans with the aim of evaluating the safety, efficacy, and quality of medicines, vaccines, or medical devices. They represent the final stage of a drug's development and form the link between laboratory research and medical practice. Before participating, volunteers receive detailed information about the study, including its risks and benefits, and must sign an informed consent form that guarantees their right to withdraw at any time. All trials follow a standardized protocol that defines the objectives, inclusion criteria, treatment, examinations, duration, and data collection methods, ensuring both safety and scientific validity. During the study, participants are monitored by specialized medical teams, and any harm resulting from the research is covered by insurance. Trials can only begin after approval from regulatory authorities, such as INFARMED, which are responsible for evaluating the scientific and ethical aspects of the research. The different phases of clinical trials have specific objectives: Phase I assesses safety and appropriate dosage; Phase II analyzes efficacy and possible side effects; Phase III compares the new treatment with existing ones; and Phase IV collects information on long-term effects after commercialization. In many studies, a placebo, a substance with no therapeutic effect, is used as a comparison. In conclusion, clinical trials are essential for the advancement of medicine, ensuring that new treatments are safe, effective, and based on scientific evidence, while contributing to a more ethical and secure medical practice.

Keywords: Clinical trials; Informed consent; Safety; Efficacy; Placebo.

WATER POLLUTION - THE EFFECTS ON THE ENVIRONMENT AND PUBLIC HEALTH

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Water pollution has become one of the greatest environmental and public health challenges of the 21st century, affecting rivers and aquifers and compromising quality of life. This study aimed to analyse the main causes of water pollution, its environmental effects, and its impacts on human health, with particular emphasis on the presence of pathogenic agents, heavy metals, and other chemical contaminants that degrade water quality and pose risks to population well-being.

To achieve this objective, a mixed methodology was used, consisting of two complementary approaches: (i) a literature review of scientific articles, technical reports, and national and international legislation, which allowed for contextualising the problem and identifying the main sources of pollution and their environmental and health consequences; and (ii) the implementation of a questionnaire survey directed at the general population, with the aim of collecting perceptions, habits, and practices related to water use and the risks associated with its contamination.

Regarding the results obtained from the 128 respondents, and concerning the main causes of pollution, 81.3% mentioned industrial discharges and 69.5% referred to the use of pesticides and/or fertilizers. Concerning the consequences of water pollution, 79.7% of participants reported biodiversity loss and 70.3% mentioned the reduction of drinking water quality. It was found that there was a broader understanding of the environmental and health impacts resulting from water pollution, contributing to the support of strategies for sustainable water quality management and the promotion of public health.

Keywords: Food labeling; Food safety;Consumer information; Allergens,Nutrition

THERMAL WATERS AND PUBLIC HEALTH — IMPLICATIONS FOR WATER MANAGEMENT AND QUALITY IN PORTUGAL

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The use of thermal waters in Portugal dates back to ancient health and wellness practices and is currently recognised as both a therapeutic and tourism resource. This article analyses the relevance of thermal waters in Portuguese public health, addressing the reported therapeutic benefits, as well as the associated microbiological and chemical risks, and the legal framework governing the sector. The importance of monitoring practices and integrated water quality management is highlighted as essential to ensuring safety and efficacy in treatments. A questionnaire on the topic was discussed, relating the results obtained to the subject under study. In addition, national examples were examined, and recommendations were presented for the sustainable and safe use of thermal water resources. The questionnaire results showed that 61.1% of respondents had never used thermal waters, although 83.3% recognised their benefits for public health and 94.4% considered it essential that the results of water quality analyses be made publicly available. These findings highlight the importance of increasing public awareness and information on thermalism, emphasising its potential as a complementary practice for health and well-being. It is concluded that thermal waters represent a valuable resource for public health and sustainable development, provided they are managed with quality, safety, and environmental responsibility, contributing to improved well-being and quality of life.

Keywords: Thermal waters; public health; water quality management; thermalism;

USE OF WATER FOR HUMAN CONSUMPTION: MANAGEMENT, QUALITY, AND SUSTAINABILITY

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Water is an essential resource for life, human health, and socioeconomic development, being indispensable for maintaining ecosystems and supporting domestic, industrial, and agricultural activities. Its use for human consumption requires strict management to ensure both quality and quantity, guaranteeing sanitary safety and environmental sustainability.

This study addresses the main aspects related to the use of water for human consumption, including its physical, chemical, and microbiological characterization, sources, treatment processes, legal and regulatory framework, as well as current challenges and good management practices. It highlights the importance of monitoring microbiological, chemical, and organoleptic parameters and implementing continuous monitoring systems, such as the Water Quality Control Plans (PCQA), supervised by ERSAR and the Directorate-General of Health.

The survey results revealed that 47.6% of respondents consume water from the public supply network, while 42.9% prefer bottled water. Among those who drink tap water, 61.9% apply some type of additional treatment, mainly through filters. The perception of safety is divided: 47.6% consider tap water safe, while taste and odor are the main factors influencing opinions about its quality. The overall assessment obtained an average score of 3.9 on a scale of 1 to 5, reflecting a moderately high level of satisfaction. Additionally, 52.4% are aware of water quality parameters, and 81% would be willing to pay more to ensure improvements, demonstrating a clear appreciation of this resource.

It is concluded that ensuring safe and high-quality water depends on an integrated approach that combines strict standards, continuous monitoring, sustainable management, and responsible citizenship, guaranteeing universal access and environmental preservation of this vital resource.

Keywords: drinking water; water quality management; human consumption; environmental sustainability; water treatment.

INFLUENCE OF FIRES ON WATER QUALITY

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The increase in the frequency and intensity of wildfires has posed a significant threat to water quality in watersheds, directly affecting environmental health and water management. This study investigated changes in physicochemical parameters, nutrients, dissolved organic carbon, and metals, as well as the mitigation measures adopted to protect public water supply, integrating evidence from recent scientific literature with information obtained through a structured interview with an environmental engineer from an affected area.

The results obtained, corroborated by the literature, indicated that fires increased turbidity, conductivity, nutrients (phosphorus and nitrogen), dissolved organic carbon, and trace metals, with effects that may have persisted for months or years, depending on the severity of the fire, the type of soil, and the vegetation cover. The interview showed that changes in the water and challenges in local water management did indeed occur, confirming the need for continuous monitoring and preventive strategies.

The study highlighted the relevance of post-fire monitoring protocols, with priority indicators such as turbidity, dissolved organic carbon, phosphorus, and nitrogen, and emphasized the importance of integrating water management practices with up-to-date scientific knowledge, underscoring that adaptive management was crucial to minimize environmental health risks and ensure the safety of water supply.

Keywords: fires; quality; pollution

MITOCHONDRIAL DYSFUNCTIONS AND HEARING

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Introduction: Mitochondria are cellular organelles responsible for energy production, regulation of apoptosis, and oxidative stress control. These organelles possess their own genetic material, which, when altered, can lead to dysfunction in their roles. Given the high concentration of mitochondria in the sensory components of the auditory system, namely in outer hair cells, the stria vascularis, and auditory pathways, and their direct involvement in the transduction of acoustic signals into electrical signals, the following question arises: Could mitochondrial dysfunctions be related to hearing alterations?
Objective: To investigate whether mitochondrial dysfunctions can lead to hearing alterations.
Methods: To address this research question, a literature search was conducted in the PubMed, ScienceDirect, SpringerLink, and Google Scholar databases using the keywords: “hearing” “mitochondria”, “hearing loss”, and “mutations”. Data were collected, in english, between March and May 2024. After applying inclusion and exclusion criteria, 6 articles were selected for analysis.
Results: Analysis of the six studies revealed an association between mitochondrial DNA mutations and sensorineural hearing loss. The mtDNA A1555G and C1494T pathogenic sequence variations(PSV) were the most frequently identified and may be exacerbated by the use of aminoglycoside antibiotics. Mitochondrial dysfunction impairs ATP production and oxidative stress regulation, leading to damage in outer hair cells, and contributing to hearing loss, which may vary in degree and age of onset.
Conclusion: A detailed analysis of the six articles included in this literature review supports the conclusion that mitochondrial dysfunctions can be a cause of hearing loss.

Keywords: Hearing; Mitochondria; Hearing Loss; Mutations

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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Donor screening is a fundamental part of transfusion and transplantation therapeutics, designed to protect both donors and recipients. The donor questionnaire made by Instituto Portugês do Sangue e Transplantação (IPST) and in alignment with various organizations, like WHO, EU and FDA, serves as an organized way to measure suitability of potential donors before collection. It guarantees that patients are clinically fit to donate and that their blood or tissues are safe for therapeutic use.

The questionnaire is multilayered covering medication used, travel-related risks, medical and infectious disease history, different lifestyle behaviours and identification and demographic data. Additional sections may be implemented for tissue and gamete donors addressing reproductive and genetic screening.

Each one of those sections can contribute to the detection of possible deferral factors, temporary or permanent, and to the prevention of transmissible infections. Ethical aspects of this questionnaire, like confidentiality, non discrimination and informed consent contribute to the responsible and voluntary nature of this decision.

Data collected through the different questionnaires is integrated into wider quality management systems, helping with donor eligibility decisions and traceability mechanisms to assess how different responses guide eligibility determination.

Finally, the IPST donor questionnaire is a dynamic and easy to follow tool that merges medical, ethical and epidemiological aspects, because of its constant updates that reflect up to date scientific evidence and cultural context. It remains as a field example of safe, ethical and high.quality practices, ensuring both donor and recipient safety and well.

Keywords: Donor Screening, Eligibility, Ethics, Safety, Quality Management

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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When an individual consents, voluntarily, to the collection of his or her own blood or tissue for therapeutic purposes, it becomes a “donor” and it can be decisive for the life of another individual. The present study is focused on the analysis and explanation of the questions that these donors have to answer, emphasizing the clinical and legal aspects, as well as their evolution to what is currently implemented. Each question has a specific purpose related to the donor and recipient’s safety, traceability and eligibility, leading to a crucial investigation about each of them, in order to clarify its scientific and clinical significance. Nowadays, there are many myths associated with the donor’s traceability and eligibility; therefore, this study aims to demystify them and suggest improvements to optimize the experience and understanding of them. It seems almost impossible to reflect deeply about the impact that donating can have on someone’s life and abandon the connotation of being just a simple altruistic gesture. However, by highlighting cases such as the case of Amber Kerr, who performed her first intervention as a donor at the age of 18 and subsequently needed a transfusion further in her life, we are able to show examples that enlighten society about the importance of being a donor. Consequently, meticulous screening and ongoing awareness are essential to ensure transfusional safety and preservation of lives.

Keywords: Donor, Traceability, Eligibility, Safety, Awareness

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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The development of the blood and tissue donation questionnaire by the Portuguese Institute of Blood and Transplantation (IPST) plays a crucial role in ensuring donor eligibility. Its primary aim is to prevent transfusion-transmitted infections and safeguard both donor and recipient health, with specific attention to major blood-borne diseases.

The questionnaire covers medical history and recent treatments to identify conditions such as hepatitis B and C, HIV/AIDS, syphilis, among others, that could be transmitted or worsened through donation. It includes inquiries about current medications and recent medical procedures, such as surgeries and transplants.

A dedicated section assesses risk behaviors, focusing on sexual practices, the use of injectable drugs, and recent body modifications (piercing, tattooing, or acupuncture) in order to minimize the risk of transmitting infections during the window period, when infections may not yet be detectable through laboratory tests.

Additionally, it also considers recent travel abroad and residence in endemic areas to identify potential exposure to vector-borne diseases such as Malaria and Chagas disease. The questionnaire also serves as a legal safeguard, by obeying the Portuguese Law and European Guidelines.

Overall, by systematically evaluating medical history, behavioral risk factors, and potential exposure to infectious diseases, the IPST blood donation questionnaire serves as a critical tool for ensuring transfusion safety. Its comprehensive approach supports public health, while still facing its challenges, due to the reliance on donors to answer truthfully and fully understand the implications of their responses.

Keywords: Blood donation; Risk behavior; Infectious disease transmission; Blood transfusion

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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The blood and tissue donor questionnaire is the first preventive measure implemented by blood banks to ensure the secure performance of transfusions and transplants. This poster aims to critically analyse the questions and dimensions included in the questionnaire used by Instituto Português do Sangue e Transplantação (IPST) and their relevance in donor screening reliability and risk assessment.

Before donating, individuals complete a health survey to determine eligibility and to identify any factors that might postpone or prevent donation.These include infectious diseases, pregnancy, recent transfusions or transplants, certain medications, high-risk sexual or drug-related behaviors, and recent use of PrEP or PEP. Donors are also reminded of the “window period,” during which infections may not yet be detectable.

A qualified healthcare professional evaluates the completed questionnaire and performs a focused assessment to finalize eligibility. Protocols outline minimum age and weight, pre-donation hydration, post-collection observation, and guidance for recognizing adverse reactions. Epidemiologic and behavioral histories, including recent travel and potential exposure to emerging pathogens, inform time-limited deferrals. All collected blood is tested for transfusion-transmissible infections, processed into separate components, and any clinically important findings are communicated to the donor.

Therefore, the IPST questionnaire functions not as a mere administrative procedure but as a precision-engineered instrument that identifies pre-diagnostic hazard, supports clinical decision-making, and integrates legal, ethical, and precautionary safeguards early in the donation process, thereby reinforcing the safety of transfusion and transplantation practices.

Keywords: Blood Donors, Risk Assessment, Patient Selection, Questionnaires, IPST

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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Donating blood and tissue is a very important act that can save many lives. It involves a rigorous and complex clinical screening process to ensure the safety of everyone involved which includes a questionnaire for blood and tissue donors. The Portuguese Institute of Blood and Transplantation (IPST) is responsible for this questionnaire. This includes the selection criteria, identifying situations that might prevent the candidate from donating and demonstrating the science behind each of the questions.

The questions analyse the donor's health condition addressing clinical, epidemiological, physiological and ethical/ legal aspects. It's necessary to know why each question is being asked to better understand the risks associated with blood donation.

This questionnaire has many advantages, such as increasing the safety of the receptor by identifying risk factors of the donor, while also allowing a systematic and efficient screening on a large scale which improves quality management.

Limitations of the questionnaire include the level of honesty of the potential donor as well as sensitive questions and misunderstandings that may lead to safety risks and self-exclusions.

Overall this questionnaire is a very useful multidimensional risk management tool where its rigorous application and the donor's truthful responses are essential for maintaining a safe blood supply and represent a non-negotiable step in the quality assurance process of immunohemotherapy.

Keywords: Blood donor, questionnaire, IPST, immunohemotherapy

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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Blood transfusion and tissue transplants are fundamental medical procedures, but can be entry doors for various diseases and complications. Therefore, donors must be in good health and free from infections to ensure the safety of the receptor, which lead to the implementation of an extended screening process, determining if optional tests are necessary. Nowadays, before donating, donors must answer a detailed questionnaire about their medical history, recent travels, medicine and substance use and potential risk behaviours (sexual practices, cosmetic procedures and others). The answers play an important role in determining donor eligibility.

However, the screening process is not completely effective due to factors such as the window period, emerging infections without available or reliable tests, and infections not routinely screened for. The importance of this questionnaire relies on the fact that, for instance, HIV/AIDS or Hepatitis can be transmitted to others through transfusion of blood components, even with negative tests and no symptoms.

This study aimed on analysing the dimensions and categories underlying the screening questionnaire of the Portuguese Institute of Blood and Transplantation (IPST, IP), with a view to understand its structural composition and clinical relevance. A categorical analysis of the 35 questions included in the questionnaire was carried out, in order to interpret their importance, both in the safety and efficacy of transfusions, and at an ethical level. Understanding the purpose of the different dimensions of the questionnaire enhances awareness among health professionals and donors regarding risk assessment.

Keywords: Blood; transfusion; questionnaire; infection

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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Blood and tissue donor questionnaires were made to ensure the safety of both recipients and donors by searching for medical conditions that could endanger the donor or excluding the ones with bloodborne or transmissible infections. These questionnaires are confidential and cover multiple dimensions including medical history, risk behaviors, recent exposures, and donor satisfaction.

In Portugal, the Blood Donor Questionnaire is provided and regulated by the Instituto Português do Sangue e da Transplantação (IPST, I.P.), the national authority responsible for overseeing all activities related to transfusion medicine, including the donation, analysis, collection, preservation, processing, storage, and distribution of human blood, organs, blood components, cells of human origin and tissues.

This poster aims to analyze and explain the structure and theoretical foundations of the Blood Donation Questionnaire, highlighting its main dimensions, the reason behind each group of questions, and how they are perceived by the donors. It also explores a few ethical implications, potential research uses, and possible improvements and future directions for the instrument.

Keywords: Blood Donor Questionnaire, transmissible infections, transfusion safety, risk behaviors

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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Blood donation is a voluntary process in which a healthy individual donates a quantity of blood to be later used in transfusions or treatments. Donated blood plays an important role in saving lives, as it can be used in transfusions in cases of hemorrhage, in the treatment of hematological diseases such as anemia, and in chronic patients who regularly require transfusions.

To minimize the transmission of infectious diseases during the transfusion process, a questionnaire is administered in which all donors must answer a set of questions to ensure that the individual is healthy and fit to donate.

The blood and tissue donor questionnaire is composed of several dimensions and types of questions, namely those related to donation awareness; health status and previous donations; origin and travel history; general medical history; recent health conditions; recent invasive procedures; behaviors and risk factors and final consent.

Each of these dimensions allows for the collection of important information to exclude situations that may pose a risk to the recipient/donor or compromise the quality of the collected blood.

Before each donation, a blood sample is collected for laboratory testing for specific diseases such as Hepatitis B, Hepatitis C, Syphilis, and HIV. Depending on the donor's origin, travel history, and health conditions, other more specific tests may be performed, such as screening for Malaria and Chagas disease.

Therefore, the administration of questionnaire to blood and tissue donors is essential, as it increases transfusion safety while ensuring the accuracy, integrity and reliability of the donation process.

Keywords: Blood donation; Surveys and Questionnaires; Blood Transfusion; Communicable Diseases; Donor selection

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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A blood and tissue donor questionnaire is a key tool in pre-donation screening to identify and exclude individuals who may not meet be eligible before laboratory testing. This approach helps to prevent the transmission of infectious diseases and ensures the safety of blood transfusions and tissue transplantation. Its analysis is crucial to better understand how risk factors guide eligibility assessment and deferral decisions. In Portugal, the eligibility of blood and tissue donors is assessed separately. This study presents an analysis of the blood and tissue donation questionnaires from the Portuguese Institute of Blood and Transplantation (IPST) and reveals the criteria for blood and tissue donors. These questionnaires are organized categorically, according to epidemiological, clinical, and behavioral risk domains, supporting a pre-laboratory filter and identifying individuals who may be within the diagnostic window period for certain infections. Key value of these items is to help in epidemiological surveillance by listing the major causes of temporary and permanent deferral, such as travel history to endemic areas, recent infections, exposure to medication or high-risk activity. Their rigorous analysis helps to refine donor selection criteria and enhance the safety of transfusion and transplantation. In conclusion, this instrument is based on a risk assessment to preserve donor eligibility and ensure evidence-based selection, while maintaining high levels of safety and quality of all blood and tissue components.

Keywords: Blood Donors, Transfusion safety, IPST, Questionnaire, Donor Screening

ANALYSIS AND EXPLANATION OF THE DIFFERENT QUESTIONS AND DIMENSIONS OF THE BLOOD AND TISSUE DONOR QUESTIONNAIRE

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To ensure a safe blood donation process, it is crucial that all national donor selection guidelines are strictly followed. For this purpose, questionnaires were created, based on clinical screening criteria, for all blood and tissue donors, ensuring transfusion safety and protecting not only recipients but also donors from any disease transmissions and adverse reactions.

The completion of the questionnaire, when carried out consciously, serves as an instrument that, in addition to promoting communication between the healthcare professional and the patient, aims to exclude potential donors with: a risk of transmitting infectious diseases such as Human immunodeficiency Virus (HIV), Hepatitis B and C viruses (HBV and HCV, respectively), and Syphilis; medical conditions that may compromise either the donation process or the donor's health; temporary causes of ineligibility (such as tattoos, surgeries, or recent infections); and high-risk sexual behaviors.

The decision on the most appropriate eligibility criteria and clinical screening process is the exclusive responsibility of a qualified healthcare professional, as many infections may not be detected by laboratory methods due to an immunological window period or due to a current unavailability of screening techniques capable of detecting infections prevalent in certain endemic areas.

Information such as culture and the surrounding environmental context present a significant ethical and transfusional safety dimension, as many risk factors are associated with infectious agents with very well defined geographical boundaries. The risk can be minimized by temporarily or even permanently delaying the donation.

Keywords: Blood Donation; Donor Questionnaire; Transfusion Safety; Infectious Diseases; Biomedical Ethics

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Keywords: Blood Donors, Transfusion safety, IPST, Questionnaire, Donor Screening

SINDROME DE USHER

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Usher Syndrome (USH) is a rare genetic condition characterized by combined hearing and vision loss and may also involve balance dysfunctions. It is the most common cause of deaf-blindness in individuals under 65 years of age, accounting for about half of all cases.

The main features of this syndrome include sensorineural, bilateral hearing loss, retinitis pigmentosa (RP) — a progressive degeneration of the retinal photoreceptor cells that initially affects peripheral and night vision — and vestibular dysfunction, which impacts balance and may cause delayed motor development in some individuals.

Usher Syndrome is divided into three types: Type I presents with congenital severe to profound hearing loss, early-onset RP, and vestibular dysfunction, being the most severe form; Type II involves congenital moderate to severe hearing loss, RP onset during adolescence, and normal vestibular function, being the most common form; Type III is characterized by post-lingual, progressive hearing loss, variable vision impairment, and mild vestibular dysfunction, being the rarest form. The inheritance pattern is autosomal recessive, involving genes such as *MYO7A*, *USH1C, CDH23, PCDH15, USH1G* (Type I), *USH2A, ADGRV1, WHRN* (Type II), and *CLRN1* (Type III). Diagnosis includes audiological, visual, and vestibular evaluations, as well as genetic testing. Management strategies involve hearing aids or cochlear implants, visual aids, balance training, and genetic counseling.The prognosis is generally good, with gradual progression of visual loss, normal life expectancy, and variable psychosocial impact.

The objective of this work is to understand Usher Syndrome, a genetic disorder that causes both hearing and vision loss, highlighting the importance of early diagnosis and appropriate support to improve the quality of life of affected individuals.

Keywords: Usher syndrome; hearing loss; genetic disorder; early diagnosis; cochlear implant;

HEARING LOSS IN TURNER SYNDROME

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Turner Syndrome (TS) is a genetic condition affecting approximately 1 in every 2,000 females, caused by the total or partial deletion of one X chromosome. Hearing loss is one of the most frequent manifestations in these patients and can significantly impact communication, learning, and quality of life. Both conductive and sensorineural hearing loss may occur, often progressing with age and requiring specialized audiological follow-up.

Hearing loss in TS is frequent and can manifest from childhood. Conductive hearing loss is often linked to recurrent otitis media and structural ear anomalies, while sensorineural hearing loss typically appears during adolescence and worsens over time. Studies show a faster progression of hearing loss compared to the general population, highlighting the influence of hormonal and genetic mechanisms. Hearing loss in Turner Syndrome is both common and progressive, emphasizing the need for early audiological screening and ongoing monitoring. The adaptation of preventive strategies and the use of hormone therapy may contribute to better hearing outcomes and improved life quality.

Objective: The aim of this study was to analyze the prevalence, characteristics, and potential genetic and hormonal factors associated with hearing loss in individuals with TS, as well as to highlight the importance of early detection and audiological monitoring.

Keywords: Turner Syndrome; Hearing loss; Audiological monitoring; Genetic factors; Hormone therapy.

SÍNDROME DE WAARDENBURG

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Waardenburg Syndrome (WS) is a rare genetic disorder associated with congenital deafness and pigmentary abnormalities affecting the eyes, hair, and skin. It is estimated to account for 2-5% of congenital deafness cases, affecting around 42,000 people. The condition was first described by Dutch ophthalmologist Petrus Johannes Waardenburg, who established the relationship between deafness, pigmentary changes in the iris and hair, and abnormalities in the development of the eyelids, eyebrows, and nasal root.

Waardenburg Syndrome is classified into four main groups: Type I – typical features of the syndrome associated with dystopia canthorum; Type II – similar to Type I but without dystopia canthorum; Type III (Klein-Waardenburg) – features of Type I plus musculoskeletal anomalies; and Type IV (Waardenburg-Shah) – general features associated with specific genetic mutations. From a genetic perspective, the syndrome is heterogeneous, with different genes linked to each type: *PAX3* (Type I and III), *MITF* and *SNAI2* (Type II), *EDNRB* and *EDN3* (Type IV).

Waardenburg Syndrome is a clinically and genetically heterogeneous condition, and early identification is essential for the diagnosis of congenital deafness and for distinguishing it from other auditory disorders. The classification into subtypes, together with the knowledge of the genes involved, contributes to a better understanding of the syndrome and to improved clinical management of affected patients.

The aim of this work is to describe the main clinical features, classifications, and genetic basis of Waardenburg Syndrome, highlighting its relevance in the differential diagnosis of congenital deafness.

Keywords: Waardenburg Syndrome, congenital deafness, pigmentary abnormalities, genetic heterogeneity.

THE BJORNSTAD SYNDROME

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Bjornstad syndrome is a congenital, autosomal recessive condition characterized by *pili torti*, sensorineural hearing loss, and hair abnormalities. It is a rare genetic disorder that affects the body's ability to produce certain proteins essential for healthy hair and hearing. This condition can have a significant impact on an individual's overall health and well-being, mainly leading to problems related to hair and hearing.

It was first described in 1965 in Oslo by Professor Roar Theodor Bjørnstad, after he observed an association between pili torti and hearing loss. Bjornstad syndrome results from mutations in the *BCS1L* gene located on chromosome 2, which is responsible for producing the BCS1L protein, a protein that plays a crucial role in oxidative phosphorylation. When this gene is altered, there is an increase in the production of reactive oxygen species, which may explain the two main symptoms of the syndrome, *pili torti* due to the hair weakening of the cells that form the hair and hearing loss, caused by the damage provoked inner ear, which are very sensitive to oxidative stress.

Pili torti is usually identified in early childhood and is characterized by brittle hair strands that are abnormally twisted. Hearing loss generally appears very early as well, often within the first year of life.

Treatment is symptomatic and aims to improve the patient's quality of life through multidisciplinary care, which may involve otolaryngologists, geneticists, and dermatologists.

This project aims to investigate and understand Bjornstad syndrome, a rare genetic disorder, through the analysis of its clinical characteristics, genetic causes, pathophysiological mechanisms, and treatment approaches, to increase knowledge about this condition and the impact that it causes on patients quality of life.

Keywords: Bjornstad syndrome; *BCS1L* gene; pili torti; sensorineural hearing loss; mitochondrial dysfunction; oxidative phosphorylation

BRANCHIO-OTO-RENAL (BOR) SYNDROME

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The Branchio-Oto-Renal (BOR) Syndrome is an autosomal dominant genetic disorder affecting the development of the ears, kidneys, and neck. It is marked by auricular malformations, hearing loss (sensorineural, conductive, or mixed), and renal anomalies ranging from mild to severe, possibly leading to end-stage renal disease. The link between ear and kidney abnormalities was first described in 1946 by Edith Potter, who reported a connection between auricular deformities and bilateral renal agenesis. Structural and functional similarities between inner ear and kidney tissues explain their frequent coexistence.

During embryogenesis, kidneys develop from pronephros, mesonephros, and metanephros, derived from the urogenital ridge, while the inner ear arises from placodes forming the vestibule and cochlea, responsible for balance and hearing. These shared embryonic origins explain the auditory–renal association. Genetically, BOR syndrome is related to mutations in *EYA1*, *SIX1*, and *SIX5*, with *EYA1* accounting for about 40% of cases. These genes encode proteins regulating gene expression during embryonic development; mutations impair these interactions, disrupting the normal formation of organs derived from the second branchial arch, as well as ears and kidneys.

Some patients with typical signs show no known mutations, suggesting other genes may be involved. Studies reveal antigenic similarities between renal and cochlear tissues, reinforcing their functional link. Moreover, toxin accumulation from renal failure can damage inner ear nerves, worsening hearing loss.

Objective: To study the causes and clinical manifestations of Branchio-Oto-Renal (BOR) Syndrome, emphasizing its genetic and embryological basis.

Keywords: Branchio-Oto-Renal Syndrome*; EYA1; SIX1; SIX5*; auricular malformations; renal anomalies; embryology.

MACROSCOPIC AND MICROSCOPIC ASPECTS OF TESTICULAR TUMORS

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Testicular tumors can be divided into two major types: benign and malign and in this study, we'll focus our attention on several of the malign subtypes. Testicular germ cell tumors (TGCTs) represent 95–98% of all testicular malignancies, of which 50–60% are seminomas, 40–50% non-seminomas, and <1% spermatocytic tumors.

TGCTs are most prevalent in men aged 15–40 years, although they account for only about 1% of all male malignancies. The remaining cases are sex cord–stromal tumors. The macroscopic appearance of the lesion helps identify the tumor type, which can be classified as seminoma or non-seminomatous. Seminomas differ from non-seminomatous tumors by presenting different macroscopic characteristics, such as lesion pattern, color, homogeneity, heterogeneity, among others. The macroscopic features and their analysis enable tumor classification, staging, prognostic assessment, and therapeutic planning. In the microscopic domain, the histopathological differences such as the type of cells affected and alterations affecting cellular morphology, extracellular matrix composition or tissue arrangement, when combined with immunohistochemical markers and clinical background, make it possible to distinguish and classify many forms of testicular tumors into two main groups: Germinative cell tumors and Non Germinative cell tumors. Ultrasonography and palpation are relevant tests to establish the initial diagnosis of testicular germ cell tumor. However, this is only confirmed through orchiectomy, accompanied by serum tumor markers. It's important to diagnose testicular tumors early because, in the initial stages, surgery can be used as treatment, contrary to more advanced stages where chemotherapy and radiotherapy are necessary.

Keywords: Testicular neoplasms, Germ cell tumor, Histopathology, Diagnosis

MACROSCOPY OF LARYNGEAL TUMORS: MAIN CHARACTERISTICS AND HISTOLOGICAL CORRELATION

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The larynx is a part of the respiratory system, located between the pharynx and the trachea, and consists of a hollow tube of about 4 to 5 cm. It is formed by different types of cartilage, muscle, ligaments and membranes and houses the vocal cords.

Laryngeal cancer is the most common malignant tumor among ear, neck and throat neoplasms, with an incidence of 10/100,000 in Europe and a 4.3/100,000 mortality rate. The large majority of these tumors (over 95%) are squamous cell carcinomas, although other types can be found.

In the histopathology laboratory, specimens from the larynx may include small biopsies or larger excision and resection samples; however, it is in resection specimens that macroscopic characteristics can be thoroughly assessed. Gross characteristics such as tumour location and extension, pattern of growth (exophytic, endophytic or ulcerative), border definition, surface appearance, and infiltration of surrounding structures provide crucial information for diagnosis and staging. These macroscopic features often correlate with histological findings, reflecting the degree of differentiation, keratinization, and stromal invasion patterns.

This study seeks to analyse the correlation between macroscopical and histological finds in laryngeal tumors, while also reviewing the normal anatomical characteristics of the larynx and its standardized gross examination protocol.

Keywords: Larynx, laryngeal tumors, squamous cell carcinomas, histological findings, macroscopical examination

DIGITIZATION AND ARTIFICIAL INTELLIGENCE IN MACROSCOPY

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Macroscopy is a crucial step of histopathology, it relies on the experience of the professional and requires detailed documentation and communication, since every measurement, description or observation will directly affect the patient's results. Thus, this phase has some limitations such as subjectivity, lack of standardization, and data recording. The digitization of macroscopy using high-resolution cameras and integrated capture systems to document samples and surgical specimens is marking a shift from manual recording to digital platforms enabling secure archiving, cataloging, and sharing of images along with the combination with clinical and laboratory databases, ensuring traceability and facilitating clinicopathological correlation.

Artificial Intelligence (AI) is increasingly applied in macroscopy as a decision-support tool and for task automation, it is used in lesion measurements, specimen orientation and recognition of different types of tissue and abnormal areas. By using deep learning algorithms, AI can also identify tumors, metastasis and even prognostic biomarkers, showing great progress in microscopic image interpretation.

Digitization and AI implementation comes with many benefits, including fast analyses (by highlighting regions of interest), less workload for pathologists, greater reproducibility, and improved data security. It also enables preservation of a specimen’s architecture after sectioning, making a contribution to education, research and quality assurance. However there are challenges, such as the high cost of technology infrastructure, maintenance requirements, and limitations in rare or damaged specimens’ diagnosis. Nevertheless, the convergence of AI and digitization is revolutionizing pathology labs leading to a more accurate, efficient and interconnected diagnostic workflow.

Keywords: Artificial Intelligence, Gross Anatomy, Digital Pathology, Photography, Data Accuracy

FREQUENT ERRORS IN THE MACROSCOPIC PHASE AND IMPACT ON DIAGNOSIS

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The macroscopic phase is a crucial step in anatomic pathology, being the first step in tissue evaluation. It comprises analysing specimens to assess physical characteristics, identify normal and pathological structures, describe lesions, take measurements, and collect representative fragments for subsequent histological processing. Its primary objective is to provide a precise and comprehensive characterization of specimens submitted for study, specify their morphology and, in the case of surgical specimens, their relationship with neighbouring structures. When performed improperly, it can jeopardize histological interpretation and lead to a wrong diagnosis. There are several errors that can occur in the different macroscopic stages, namely orientation, dissection, description, and sampling. Grossing errors include incomplete or incorrect macroscopic identification of the sample, insufficient anatomical knowledge, inadequate tissue fixation, mixing of fragments from different cases, failure to mark surgical margins, and subsequent fixation. These can cause false negatives, artefact creation, errors in surgical assessment and delays in diagnosis, which implies a very significant impact on diagnosis, staging, and treatment planning. Consequently, these errors may necessitate supplementary investigations, repeat biopsies or even reoperation endangering patient's health, delays in issuing the report, and increased costs.

This study seeks to identify and analyze recurrent errors in macroscopic tissue that may compromise the diagnosis and the patient's safety.

In conclusion, to reduce errors, standardized and reproducible protocols and continuous professional formation should be implemented, in line with guidance from the Royal College of Pathologists and the College of American Pathologists.

Keywords: Errors, Macroscopy, Diagnosis, Pathology

COMPARISON BETWEEN DIFFERENT METHODS OF ORGAN PRESERVATION FOR TEACHING

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The preservation of organs and tissues is a concept that has been discussed and studied since the ancient Egyptian times and mummification was one of the first combinations of methods used to maintain the bodies for a long period of time. However, as time went by, new techniques have emerged and when it comes to preserving organs and tissues for teaching purposes, there are various available.

This study discusses options for preservation such as formalin, plastination, glycerination, FineFix, Amber and Thiel.The main goal of these methods is to maintain the color, texture and structural integrity of the pieces, inhibiting autolysis, and compares them by their advantages and disadvantages.

Each method differs in how effectively it preserves the organs' morphological features and in how safe or practical it is for educational use. Formalin keeps being the standard for its long-term storing properties, although it is a highly carcinogenic agent and can interfere in certain analyses like in immunohistochemistry, for example, which makes searching for a better and viable alternative urgent.

New methods to replace formalin are being studied, such as glycerination, Thiel's method and the use of Amber or FineFix, which have been shown to preserve well the organs while being less toxic than formalin. However, there's still little scientific evidence since these are expensive methods.

Overall, the choice of preservation method should take into account the purpose of the study, balancing both tissue quality and safety.

Keywords: organ conservation, formalin, plastination, glycerination, thiel

MACROSCOPY OF SPLEEN LESIONS: MAIN FEATURES AND HISTOLOGICAL CORRELATION

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The spleen, a secondary lymphoid organ situated in the peritoneal cavity, plays a vital role in blood filtration and immune regulation. Its macroscopic characteristics, combined with histopathological findings and evaluation by immunochemistry, provide essential diagnostic information. The spleen is structurally a smooth, lustrous and red organ composed of two major units: the white and red pulps.

Splenic lesions can be categorized as reactive, infectious, vascular, neoplastic, and traumatic. Reactive conditions, such as perisplenitis and white or red pulp hyperplasia, often reflect systemic immune or inflammatory stimuli. Infectious causes (bacterial, viral, or fungal) may produce necrotic, granulomatous, or abscess-forming lesions. Vascular abnormalities, including hemangioma, hamartoma, and Sclerosing Angiomatoid Nodular Transformation (SANT), often present as nodular or hemorrhagic areas. Neoplastic manifestations, mostly secondary, circumscribe a wide spectrum of hematolymphoid malignancies such as Splenic Marginal Zone Lymphoma, Follicular Lymphoma, Chronic Lymphocytic Leukemia, Hairy Cell Leukemia, Diffuse Large B-cell Lymphoma and Hodgkin Lymphoma. Traumatic injuries may lead to capsular rupture, hematomas and even infarction, stimulating pathological enlargement.

Macroscopically, these conditions englobate findings like splenomegaly, nodular surfaces or diffuse enlargement of the spleen, which histologically correlate with variable degrees of pulp distortions, alterations in pulp ratio, cytological atypia, parenchymal replacement or neoplastic infiltration. Cysts, hamartomas, and vascular proliferations may appear as focal masses.

In conclusion, integrating macroscopic aspects with histological characteristics, and even immunophenotypic correlation, is crucial to distinguish between benign reactive, vascular, infectious, traumatic, and neoplastic entities and also in recognizing the incidence and pathological spectrum of all splenic lesions.

Keywords: Spleen; Histology; Pathology; Splenomegaly; Lymphoproliferative disorders

Discipline: Morphology and Histotechnology

Professor: Diana Martins

Degree: Biomedical Laboratory Sciences

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MACROSCOPY OF THYROID LESIONS: MAIN FEATURES AND HISTOLOGICAL CORRELATION

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Known as the largest endocrine gland in the body, the thyroid gland is situated in the neck and consists of two lobes joined together by the isthmus. It performs a wide range of essential physiological functions and can be affected by numerous disorders, including functional abnormalities, immunologically mediated enlargements and neoplastic conditions.

Macroscopic evaluation is a crucial step for anatomopathological studies because it allows the identification of morphological patterns and alterations as well as its relation with the histology aspect. This relation provides a better understanding of the structural alterations of the gland and their association with the pathophysiological mechanisms of various lesions, thereby enabling a more accurate diagnosis.

The distinction between diffuse and nodular diseases is the first step to evaluate thyroid pathologies. While in diffuse disorders the diagnosis is typically easy, in nodular diseases it is necessary to determine if it is benign or malignant and, if malignant, to identify the tumor subtype. Benign nodules are most commonly follicular adenomas or hyperplastic nodules. Malignant lesions are of epithelial origin, specifically carcinomas, where the most frequent are those of follicular derivation.

Considering the reactive diffuse lesions, which are the most frequent, these include goitre, such as colloid nodules or multinodular goitre, and thyroiditis, an inflammatory disease that is more frequent in women, such as Hashimoto's Thyroiditis.

Therefore, it's important to analyse the main macroscopic characteristics of thyroid lesions and their microscopic counterparts, based on macroscopic protocols, clinical cases, and previously published studies.

Keywords: Thyroid gland; Thyroid lesions; Histopathologic classification; Macroscopic characteristics; Nodular diseases

BENIGN *VS* MALIGNANT BONE LESIONS: COMPARATIVE MACROSCOPIC FEATURES

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Macroscopic evaluation is the essential first step in assessing bone lesions, allowing early distinction between benign and malignant processes before histological confirmation. This approach guides risk stratification, biopsy timing, and therapeutic planning. Systematic review of lesion configuration, margin clarity, cortical integrity, and periosteal response provides critical context for imaging and clinical interpretation, forming a reliable foundation for safe and effective decision-making.

Benign lesions, such as osteochondroma and enchondroma, typically exhibit slow growth, well-defined borders, and a sclerotic rim with a narrow transition zone. The cortex remains intact, without soft-tissue invasion, and bone destruction is usually geographic with a smooth, non-aggressive periosteal reaction.

Conversely, malignant lesions — such as osteosarcoma and Ewing sarcoma — show indistinct margins, cortical erosion, pathological fractures, and soft-tissue extension, often accompanied by aggressive periosteal patterns like sunburst, onion-skin, or Codman's triangle. Matrix mineralization tends to be irregular and asymmetrical. Although overlap exists, high-grade sarcomas commonly arise in metaphyseal regions of long bones in younger individuals, whereas benign lesions are often incidental findings.

Recognizing these macroscopic distinctions is crucial for the differential diagnosis between benign and malignant bone disease, as this directly influences therapeutic strategy—ranging from conservative observation to radical surgical resection and adjuvant therapy. Integrating morphological assessment early in the clinical pathway improves diagnostic accuracy, optimizes treatment decisions, and ultimately enhances patient outcomes.

Keywords: Lesion margins, Periosteal reaction, Cortical involvement, Soft-tissue extension

Discipline: Morphology and Histotechnology

Professor: Diana Martins

Degree: Biomedical Laboratory Sciences

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Ovarian Tumors: Macroscopic Features Of The Main Types (Serous, Mucinous, Endometrioid)

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Ovarian tumours constitute a heterogeneous group of neoplasms that vary widely in origin, biological behaviour, and morphology.

Epithelial-origin tumours account for approximately 90% to 95% of malignant ovarian neoplasms and are classified into different histological subtypes, most notably serous, mucinous, and endometrioid. Serous carcinoma is the most frequent, representing approximately 60% to 75% of epithelial tumours, followed by endometrioid carcinoma, which accounts for about 10%, and mucinous carcinoma, responsible for approximately 3% to 6% of cases. This distribution may vary depending on the population under analysis and the diagnostic criteria.

This study aims to review the major macroscopic features of these three main subtypes, based on updated scientific sources, which are essential for differential diagnosis and for guiding histopathological examination.

The differentiation among the various epithelial subtypes holds great clinical significance, as each presents distinct biological, prognostic, and therapeutic characteristics. Serous carcinoma, typically of high grade, tends to manifest aggressively in advanced stages, whereas mucinous and endometrioid tumours are generally diagnosed at earlier stages and may be associated with a more favourable prognosis.

It is concluded that the systematic identification of macroscopically observable morphological patterns contributes to a more accurate and integrated diagnostic approach in the evaluation of ovarian tumours.

Keywords: Ovarian neoplasms; Ovarian epithelial carcinoma; Serous tumour; Mucinous tumour; Endometrioid tumour

PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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This paper analyzes the role of Portuguese local authorities in promoting sustainability and implementing the United Nations' 2030 Agenda for Sustainable Development Goals (SDGs). It explores municipal responsibilities in key areas such as sanitation, water and waste management, energy, mobility, land use planning, and civil protection. The study highlights good practices from cities like Lisbon, Porto, Cascais, and Braga, showcasing progress in climate action, sustainable mobility, and energy efficiency. However, challenges remain regarding technical and financial resources and the need for stronger coordination between government levels. Finally, several improvement proposals are presented to enhance institutional capacity, foster citizen participation, and ensure a fair and effective ecological transition.

Keywords: Local authorities, Sustainability, SDGs, Environment, Local policies.

PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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This paper analyzes the role of Portuguese local authorities in promoting environmental protection and sustainability, within the framework of the United Nations 2030 Agenda and the Sustainable Development Goals (SDGs). Local governments — municipalities and parishes — are key actors in the implementation of public policies that integrate economic, social, and environmental dimensions, with direct responsibilities in areas such as water supply, sanitation, waste management, mobility, energy, land use planning, and civil protection.

Based on the Portuguese legal framework, the study highlights municipal competences in essential domains such as basic sanitation, energy efficiency, circular economy, and environmental education. It also underlines the importance of intermunicipal cooperation and participatory governance as strategic instruments to achieve integrated and sustainable resource management.

Case studies from municipalities such as Cascais, Lisbon, Porto, and Sintra illustrate the local implementation of SDGs, particularly Goals 6, 7, 11, 12, 13, 14, and 15. Despite notable progress, challenges remain concerning financial and human resource constraints and the need for stronger multilevel coordination.

The paper concludes that strengthening technical capacities, mainstreaming the SDGs into local strategic planning, and enhancing community engagement are essential to advancing the ecological and climate transition in Portugal, ensuring environmental sustainability and the well-being of present and future generations.

Keywords: Local authorities, Sustainability, Sustainable Development Goals, Environment, Local Governance, Environmental Poli

PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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This study analyzes the contribution of Portuguese municipalities to the achievement of the Sustainable Development Goals (SDGs), focusing on areas such as the environment, administrative innovation, and social inclusion. By identifying best practices in municipalities like Lisboa, Cascais, Coimbra, and Almada, the fundamental role of local governments in managing digital public services, ecological transition, and support for vulnerable groups is highlighted. The research shows positive impacts such as increased administrative efficiency, strengthened social cohesion, and improved environmental quality.

The investigation relies on official statistical sources like the Local Power Atlas and the Municipal Portal, enabling a comparative and well-founded analysis of existing practices. Despite progress, structural challenges remain, including a shortage of technical and financial resources, territorial inequality, urban pressure, and limited citizen participation in decision-making processes. Through concrete proposals such as strengthening technical capacity, investing in sustainable mobility, promoting the circular economy, and valuing ecosystems, the study suggests pathways to enhance municipal action and align local policies with the 2030 Agenda.

Keywords: Municipalities, Sustainability, SDGs (Sustainable Development Goals), Best Practices, Environment, Innovation, Circular Economy, Citizen Participation

PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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This report analyzes the role of Portuguese local authorities in promoting environmental sustainability in alignment with the United Nations 2030 Agenda and its Sustainable Development Goals (SDGs). Municipalities and parishes play a key role in implementing public policies that balance economic development, social cohesion, and environmental preservation. The study examines the main legal and functional competences of local authorities, the mechanisms for implementing environmental policies, their direct connection to the SDGs, and ongoing best practices across the country. Based on recent statistical data (INE, PORDATA, UN, Eurostat, 2024–2025), the report shows that Portugal has made significant progress in several areas, though some European targets remain unmet. The findings highlight that local sustainability relies on integrated public policies, greater technical and financial capacity at the municipal level, and active citizen participation in planning and decision-making processes.

Keywords: Sustainable Development Goals; environmental sustainability; environmental preservation;

PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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The report analyzes the role of Portuguese municipalities in promoting environmental sustainability in light of the Sustainable Development Goals (SDG). It highlights the responsibility of municipalities in managing water, waste, energy, transport, civil protection, and biodiversity, showcasing their capacity to mobilize citizens and implement local policies. Concrete examples are presented from municipalities such as Lisboa, Cascais, Guimarães, Matosinhos, and Águeda, which have adopted innovative measures in energy efficiency, sustainable mobility, selective waste collection, and environmental preservation. Despite the progress, challenges persist, such as unequal resources, dependence on external funding, and limited citizen participation. The report proposes strategic actions, including municipal climate action plans, energy communities, digitalization, environmental education, and inter-municipal sustainability networks, reinforcing the role of municipalities as essential agents in the ecological transition and in the achievement of the SDG in Portugal.

Keywords: Portuguese Municipalities, Environmental Sustainability, Sustainable Development Goals, Water and Waste Management, Civil Protection.

PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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This paper analyzes the role of Portuguese municipalities in promoting environmental sustainability and in achieving the Sustainable Development Goals (SDGs) defined by the United Nations 2030 Agenda. As the level of government closest to the population, municipalities occupy a strategic position in implementing policies that promote balanced economic, social, and environmental development. The Constitution of the Portuguese Republic, as well as Law No. 75/2013 and Law No. 50/2018, grant municipalities essential competences in areas such as basic sanitation, waste management, energy efficiency, sustainable mobility, land use planning, and environmental protection.

These responsibilities make municipalities fundamental actors in achieving the SDGs, with particular emphasis on Goals 6 (Clean Water and Sanitation), 7 (Affordable and Clean Energy), 11 (Sustainable Cities), 12 (Responsible Consumption), 13 (Climate Action), and 15 (Life Terrestrial). As an example of good practice, the Lisbon City Council is mentioned, distinguished as the European Green Capital 2020, for its commitment to sustainable mobility, efficient energy and water management, and the creation of green spaces.

These initiatives have contributed to reducing carbon dioxide emissions and improving quality of life, although challenges remain, particularly in continuous funding and changing population habits.

The study also proposes several improvement actions, among which stand out: strengthening environmental education and awareness, promoting public transport and soft mobility, encouraging renewable energy, integrating environmental criteria in urban planning, and increasing civic participation in local decisions. In summary, it is concluded that the success of sustainability policies in Portugal will largely depend on the capacity of municipalities to integrate the environmental dimension into their strategies development, creating greener, more inclusive and resilient communities, capable of responding to future climate and social challenges.

Keywords: Sustainability, Energy efficiency, Environmental education, Development Goals (SDGs), Waste management

Discipline: Municipal Intervention for Sustainability

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PORTUGUESE MUNICIPALITIES AND SUSTAINABILITY IN CONNECTION WITH THE SDGs

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Portuguese local authorities, comprising municipalities and parishes, play a central role in promoting the environment and sustainability, and are fundamental to the achievement of the Sustainable Development Goals (SDGs) of the 2030 Agenda. Endowed with administrative and financial autonomy, these entities assume responsibilities in areas such as water management, waste, energy, urban planning, and civil protection. Their proximity to the population allows them to adapt national policies to local realities, although they face financial constraints, a lack of specialized technicians, and difficulties in inter-municipal coordination.

In fulfilling the SDGs, initiatives such as the modernization of water supply and sanitation networks (SDG 6), the promotion of energy efficiency and renewable energy (SDG 7), sustainable urban planning and soft mobility (SDG 11), waste management and encouragement of the circular economy (SDG 12), and the development of municipal plans for adaptation to climate change (SDG 13). Cases such as Coimbra, Lisbon, and Guimarães demonstrate differentiated and effective good practices, such as reducing water losses, applying PAYT tariffs, and investing in sustainable transport.

However, the generalization of these measures requires more resources, technical training, and cooperation between municipalities. Strengthening the training of technicians, improving access to green financing, and increasing citizen participation are essential strategies for consolidating the role of local authorities in the ecological transition.

In short, Portuguese local authorities are decisive agents of local sustainability, translating the global goals of the SDGs into concrete actions that improve quality of life and strengthen the environmental resilience of the territory.

Keywords: Local authorities, Sustainability, Environment and Sustainable Development Goals (SDGs)

MITOCHONDRIAL TRANSCRIPTION FACTORS

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Mitochondrial gene expression is fundamental for cellular energy metabolism and the maintenance of homeostasis, and being controlled by transcription factors. Alterations in the regulation of these factors have been associated with various diseases related to mitochondrialdysfunction.This narrative review aims to investigate the structural and functional roles of the main mitochondrial transcription factors, TFAM, TFB2M, TEFM and MTERF, by exploring their mechanisms of action and possible implications in pathologies.The bibliographic search was carried out in the PubMed, Scopus and Web of Science databases, considering studies published between 2014 and 2024, and following the PRISMA guidelines. Sixteen studies, from an initial total of 1826 records, were selected that highlighted the coordinated action of the factors in the initiation, elongation and termination of mitochondrial transcription. Alterations in the expression or function of these factors were found to be associated with pathologies such as Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leukoencephalopathy, sepsis, gliomas, meningiomas and lung cancer.The results of the studies' analysis the crucial role of the factors in DNA mitochondrial stability and control of mitochondrial transcriptional activity. In addition to being central regulators of gene expression, these factors have potential as biomarkers and therapeutic targets for pathologies linked to mitochondrial dysfunction, as revealed by the studies selected for deep analysis.However, most of the available research is based on expression analysis, and further research through in vivo studies is recommended for a more precise understanding of the impact of the transcription factors in mitochondrial function and stability.

Keywords: human mtDNA; TFAM; MTERF; TEFM; Mitochondrial dysfunction

TRANSDERMAL PATCHES

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Transdermal patches are innovative drug delivery systems that release medication continuously through the skin, offering a non-invasive alternative to traditional administration routes such as oral or injectable methods. These systems are composed of several layers — including a backing layer, a drug reservoir, an adhesive layer, and a protective film — which ensure the stability and effectiveness of the controlled drug release.

Among their main advantages are the gradual release of the drug, reduced frequency of administration, improved treatment adherence, and decreased side effects. However, they also show some limitations, such as the possibility of skin irritation, restriction to lipophilic drugs, and high production costs.

Currently, transdermal patches are widely used in therapies involving nicotine, fentanyl, estradiol, rivastigmine, and clonidine. The future of transdermal systems points toward applications in areas such as diabetes, Parkinson's disease, needle-free vaccination, and cancer therapies, driven by advances in nanotechnology and materials engineering.

Thus, transdermal patches represent an important evolution in modern pharmacotherapy, promoting greater comfort, efficacy, and adherence among patients.

Keywords: Transdermal; Patches; Release; Drug; Adherence.

PREPARATION OF ELIXIRS

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Mouthwashes are liquid pharmaceutical preparations used in both therapeutic treatment and oral hygiene. They can be classified by type: daily mouthwashes, mouthwashes for sensitive gums and tooth sensitivity, antiseptics, mouthwashes for children, and whitening mouthwashes. They contain various ingredients, serving as carriers, stabilizers, preservatives, flavorings, and sweeteners. These can be produced using different equipment and preparation methods, always observing certain precautions. Mouthwashes also have different applications, including therapeutic, technological, cosmetic, and herbal uses. In conclusion, they represent a versatile and effective pharmaceutical form that combines medical and aesthetic utility, providing safety, efficacy, and comfort to the user.

Keywords: Elixirs; Pharmaceutical preparations; Oral hygiene; Ingredients.

PHARMACEUTICAL ENEMAS AND MICROENEMAS

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Enemas and microenemas are rectal pharmaceutical dosage forms used as an alternative to oral drug administration, especially when this route is not feasible or when a local effect on the rectum or colon is desired. Enemas consist of large-volume liquid solutions (100 to 1000 mL), while microenemas have smaller volumes (2 to 10 mL) and are easier to apply, causing less discomfort. These products may contain different active substances, such as laxatives (sorbitol, glycerin, bisacodyl, sodium phosphates) or anti-inflammatory agents (mesalazine, corticosteroids), depending on the therapeutic indication. They are used in the treatment of constipation, inflammatory bowel diseases, or as preparation for procedures such as colonoscopy. In their formulation, factors such as pH, osmolarity, viscosity, and compatibility between components must be considered to ensure efficacy, stability, and patient comfort. Prolonged use should be avoided due to the risk of dependence and adverse effects. The pharmacy technician plays an essential role in providing guidance on the correct use of these pharmaceutical forms, including dosage, administration technique, and precautions. Enemas and microenemas are effective and useful therapeutic options, particularly when a local action is required or when other routes of administration are not possible. Their use should be judicious and based on clear clinical indications, with technical knowledge from pharmacy and healthcare professionals being fundamental.

Keywords: Rectal administration; Enemas; Microenemas; Dosage Guidance.

HOMOGENIZATION BY TURBULENCE AND CAVITATION OF CREAMS

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The homogenization of creams is crucial to ensure a stable and uniform mixture, mainly performed through two methods: turbulence and cavitation. In turbulence homogenization, the phases are dispersed by shear forces generated by the turbulent motion of the fluid, reducing particle size to the micrometer scale. This method is simple and efficient but may not be effective for very fine emulsions and can generate heat, which affects temperature-sensitive ingredients. In cavitation homogenization, the fluid undergoes pressure variations that form microbubbles, whose collapse releases shock waves, creating a very fine and homogeneous dispersion with particles smaller than 1 µm. This method is effective for producing more stable emulsions with better texture, but it requires more expensive equipment and higher energy consumption. The choice of process depends on the type of product and the desired stability. Both methods are essential for obtaining high-quality emulsions with a uniform texture.

Keywords: Homogenization; Emulsion; Cavitation; Turbulence; Stability.

POLYMERIC NANOPARTICLES

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Polymeric nanoparticles, submicron particles that disperse well in liquids, have significant potential in pharmacology, medicine, and biotechnology due to their small size. This size increase enhances the surface area, facilitating the dissolution of poorly water-soluble drugs and aiding their transport across biological barriers, while also enabling controlled drug release. They enhance the stability and bioavailability of active compounds while minimizing secondary effects. Key performance metrics include size, morphology, zeta potential, and encapsulation efficiency, with particles under 200 nm showing improved circulation and penetration. A zeta potential of ±30 mV is optimal for stability, and encapsulation efficiency varies withe preparation methods. In pharmacology, nanoparticles provide specific, prolonged drug release, enhance the absorption of hydrophobic substances, and act as non-viral vectors for gene therapy and vaccine formulations. They can be classified as natural (e.g., chitosan, alginate) or synthetic (e.g., PLA, PLGA) based on their biocompatibility and controllable properties. Main production methods like nanoprecipitation and emulsion polymerization affect critical characteristics. Advantages include precise drug delivery and high loading capacity, while disadvantages involve safety concerns and manufacturing challenges. Ethical issues related to nanotechnology call for regulation to ensure responsible use. Overall, although promising for controlled drug delivery, further research is essential to address safety and ethical considerations.

Keywords: Nanoparticles; Drug delivery; Encapsulation efficiency; Biocompatibility; Controlled release.

OINTMENT MATURATION PROCESS

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Ointments are semi-solid pharmaceutical forms applied externally for protection, lubrication, or topical therapeutic action. After preparation, they undergo a maturation process, which consists of a period of rest at controlled room temperature, usually 24 hours, which may vary depending on the composition and type of ointment base, essential to achieve physical-chemical stability and final consistency of the formulation. The types of ointment bases are: oily bases, water-soluble bases, O/W emulsifiers, and W/O emulsifiers. During this period, the microstructure of the ointment is reorganized, allowing the components to distribute evenly. This balance is essential to ensure stable homogeneity, viscosity, and texture, guaranteeing the quality and performance of the product. The absence of this step can cause physical instability, phase separation, loss of homogeneity, changes in viscosity and texture, as well as compromising the release and absorption of the active ingredient, reducing therapeutic efficacy. Several preparation factors, such as the temperature at which the components are added and the homogenization speed, directly influence the internal structure of the ointment, which stabilizes during maturation. After this phase, characterization tests (analysis of appearance, color, pH, viscosity, and homogeneity) are performed to confirm stability and identify possible physical changes. It can be concluded that maturation is a critical step in the manufacture of ointments, ensuring that the formulation achieves optimal physical properties, stability, and therapeutic efficacy of the final product.

Keywords: Ointment; Maturation; Stability; Homogenization.

USE OF MICELLES IN DRUG PRODUCTION

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Micelles are colloidal structures formed by amphipathic molecules, with a hydrophilic (external) part and a hydrophobic (internal) part. Their nanometric size (10–250 nm) allows for greater surface area, use in colloidal formulations and inhalation dispersions.
In drug production, micelles function as drug delivery systems, increasing solubility, stability, and bioavailability. They also allow controlled and targeted release, preventing adverse effects and protecting the drug from manipulation. They are used in areas such as oncology, ophthalmology, dermatology, and imaging; examples of encapsulated drugs include doxorubicin and paclitaxel. In cosmetics, micelles are used in micellar waters and facial cleansers to cleanse impurities, remove oil, and remove makeup without harming the skin.
Among the main production methods are oil/water emulsions, used for hydrophobic drugs; water/oil/water emulsions, for hydrophilic drugs; direct dialysis, co-solvent evaporation, and spray drying, which are employed to encapsulate poorly soluble substances and facilitate large-scale production. There are several types of micelles, including regular micelles formed in aqueous media to solubilize poorly soluble drugs, reverse micelles formed in organic media that encapsulate water-soluble compounds, unimolecular micelles consisting of a single stable amphiphilic molecule, and polymeric micelles, which are more stable and widely used in pharmaceutical nanotechnology. Drug protection, increased selectivity and biocompatibility, and improved pharmacokinetic profile (ADME). Low in vivo stability and limited drug loading capacity. Micelles improve therapeutic efficacy and safety. Despite its advantages, it still faces challenges regarding stability and encapsulation capacity.

Keywords: Micelles; Micellar encapsulation; Controlled release; Stability; Bioavailability.

PREPARATION OF PHARMACEUTICAL OVULES

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Pharmaceutical ovules are solid, ovoid dosage forms intended for vaginal administration, allowing for the local or systemic release of active substances. They are widely used in gynecological therapies due to their ability to provide direct action and reduce systemic side effects. The choice of base is a critical factor for the efficacy and safety of the formulation, as it influences the melting point, compatibility with the active substance, and interaction with vaginal tissues.The bases may be lipophilic, such as cocoa butter and Witepsol®, which melt at body temperature; hydrophilic, generally composed of polyethylene glycols, which dissolve in vaginal fluids; or amphiphilic, combining characteristics of both. The preparation process involves the selection and quality control of raw materials, formulation calculations considering the displacement factor, melting and incorporation of the active ingredient, mould filling, cooling, demoulding, packaging, and labelling. Quality control ensures uniformity of weight and content, appropriate melting point, satisfactory appearance, and absence of contamination. Storage should be carried out below the melting point of the base, in a dry environment protected from light, to ensure physicochemical stability. The preparation of ovules requires precision and adherence to the principles of pharmaceutical chemistry and technology, in order to guarantee therapeutic efficacy and patient safety.

Keywords: Pharmaceutical ovules; Vaginal administration; Gynecological therapies.

LINIMENTS

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Liniments are galenic preparations for topical use, traditionally employed to relieve muscle and joint pain, reduce inflammation, and stimulate local circulation. They are presented as liquid or semi-solid solutions applied to the skin by gentle rubbing. Their composition includes a hydroalcoholic, oily, or emulsified base and active ingredients with therapeutic action, such as methyl salicylate, menthol, camphor, capsicum, and essential oils. Depending on the desired effect, they are classified as stimulants or rubefacients (which increase blood flow and produce a warming sensation) and as soothing or analgesic (which relieve pain and relax muscles). They should be applied only to intact skin, avoiding mucous membranes, wounds, and contact with the eyes. Caution is necessary in sensitive populations such as children, the elderly, and pregnant women. Although they are traditional formulations, liniments maintain therapeutic relevance due to their effectiveness, ease of application, and rapid action in relieving musculoskeletal pain and inflammation.

Keywords: Liniments; Galenic preparations; Topical use; Local circulation; Skin application.

SAFE TEMPERATURES FOR SAFE FOOD

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Temperature control is essential in food hygiene and safety, as it influences microbial growth and the risk of foodborne illnesses. This study aimed to analyze the importance of safe temperatures in food storage and preparation, as well as to assess public perceptions regarding defrosting practices and high-risk foods.

To achieve this, a mixed methodology was employed: (i) a literature review of scientific articles, reports from the Portuguese Food and Economic Safety Authority and national and European legislation on good practices and temperature control; and (ii) a questionnaire administered to 107 participants to collect information on habits and perceptions related to food defrosting and storage.

Regarding the results, 57.9% of participants indicated the refrigerator as the safest method for defrosting foods, while 40.2% reported defrosting at room temperature. Concerning high-risk foods, 74.8% identified fish and seafood, and 10.3% pointed to pork.

These findings reveal gaps in food literacy, highlighting the importance of safe storage and defrosting practices to prevent foodborne illnesses and protect public health.

Keywords: Temperature control; Danger zone; Pathogenic microorganisms

FOOD POISONING: CAUSES AND RECENT EVENTS — CASES IN PORTUGAL, IDENTIFIED CAUSES, AND PREVENTIVE

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Food poisoning remains a persistent public health problem, with biological agents (bacteria, viruses, parasites), toxins, and chemical substances as the main causes. This article provides a focused review of the literature and official Portuguese reports on recent outbreaks and known cases in Portugal, describing the most frequently identified causes and summarising the institutional and operational measures adopted to prevent new events. Relevant cases, transmission mechanisms, common failures in the food chain, and prevention strategies (surveillance, control in production, legislation, inspections, food education, and traceability) are presented. A questionnaire was also conducted, revealing that 74.2% of participants stated they had never suffered from food poisoning, while 25.8% reported having experienced such a situation. The results align with national epidemiological data, in which handling and storage errors remain among the main causes of outbreaks.

It is concluded that effective prevention requires a “One Health” approach, intersectoral collaboration, continuous monitoring, and transparent communication with the public.

Keywords: Food poisoning; food safety; food education

FOOD WASTE AND FOOD SAFETY: A GLOBAL AND LOCAL CHALLENGE IN PROMOTING FOOD HYGIENE AND HEALTH

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Food waste constitutes one of the major contemporary challenges to sustainability, food security, and public health. It is estimated that around one-third of all food produced globally is lost or wasted along the food supply chain, from production to final consumption. This phenomenon represents not only an economic and ethical issue but also a significant threat to food security, the environment, and human health. This study aims to analyze the relationship between food waste and food safety, exploring its causes, impacts, and possible mitigation strategies within the context of hygiene and food health.

The analysis of the literature and collected data revealed that food waste results from multiple factors that vary across sectors. In production and distribution, overproduction, logistical failures, and aesthetic standards were identified as key drivers; in the food service sector, inadequate planning and oversized portions were predominant; and, at the household level, lack of knowledge about food preservation and poor meal planning were significant contributors. Cultural and behavioral factors further reinforce these trends.

A direct relationship was also observed between inadequate hygiene and food safety practices and increased food waste, particularly due to improper storage and insufficient temperature control. Conversely, the adoption of good hygiene and safety practices proved effective in reducing food losses.

It is concluded that mitigating food waste requires an integrated approach based on effective public policies, food education, and strict hygiene and safety practices, thereby contributing to sustainability and the protection of public health. The study is based on a literature review of official documents and recent scientific research.

Keywords: food waste; food security; food hygiene; sustainability; public health

MAIN EATING DISORDERS AND FORMS OF PREVENTION

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Eating contaminated food is one of the leading causes of infectious diseases globally, affecting millions of people each year. In Portugal, data from the Directorate General for Health and the Food and Economic Safety Authority indicate that bacteria of the genus *Salmonella* and *Listeria monocytogenes* continue to be among the most frequent agents in food outbreaks, followed by microorganisms such as *Escherichia coli, Clostridium botulinum* and enteric viroses such as Norovirus and Hepatitis A virus.

The present work addresses the main food diseases and forms of prevention, highlighting the importance of food security as an essential factor of public health.

The methodology applied was based on a narrative bibliographic review, of a descriptive and exploratory nature, supported by scientific and institutional sources.

The results show that food contamination can occur at any stage of the food chain, from production to distribution and consumption, with poor hygiene and conservation habits being the most common causes. Among the most effective preventive measures are: proper washing of hands and utensils, thorough cooking of food, storage at safe temperatures, sanitary control of products of animal origin and strengthening food supervision and education.

It is concluded that the reduction of food outbreaks depends on the joint efforts between producers, health authorities and consumers. Health education, epidemiological surveillance, and strict compliance with food hygiene standards are key to ensuring food safety and protecting public health in Portugal.

Keywords: Food safety; food diseases; public health

SUSTAINABILITY IN FOOD PRODUCTION

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This study analyzes the role of temperature control in food hygiene and safety, recognizing it as a key factor in preventing foodborne intoxications and infections. Temperature directly affects microbial growth: refrigeration slows most bacteria, while proper heating destroys pathogenic microorganisms. The “danger zone” (approximately 5 °C to 60 °C) is the range where microorganisms multiply rapidly, highlighting the need to keep foods cold (≤ 5 °C) or hot (≥ 60 °C). The legal framework, established by Regulation (EC) No. 852/2004 and implemented in Portugal via Decree-Law No. 113/2006, holds food business operators responsible for maintaining the cold chain and applying HACCP principles, preventing conditions that favor microbial growth or toxin formation.

From a microbiological perspective, even brief periods in the danger zone can allow rapid multiplication of bacteria such as *Salmonella* spp., *Escherichia coli* O157:H7, and *Staphylococcus aureus*. Psychrotrophic microorganisms, like *Listeria monocytogenes*, can grow slowly at refrigeration temperatures, reinforcing the importance of strict time and temperature control.

Methodologically, this study is based on a literature review and a questionnaire administered to the general population, aiming to assess practices and perceptions regarding the topic. The results are intended to raise awareness and promote good practices related to “safe temperatures for safe food,” helping ensure proper food handling and reduce the risk of foodborne illnesses.

Keywords: Temperature control; Danger zone; Pathogenic microorganisms;

FOOD LABELING: CONSUMER INFORMATION AND SAFETY - THE IMPORTANCE OF CLEAR FOOD LABELING

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This article explores the crucial intersection between Sustainability in Food Production and the imperatives of Hygiene and Food Safety (HFS), in the context of the United Nations' 2030 Agenda and the European Union's Farm to Fork Strategy. The work adopts an exploratory and descriptive approach, based on documentary analysis and literature review of institutional and academic sources, focusing on Sustainable Development Goal (SDG) 12.

The results demonstrate that sustainability and HFS are interdependent and mutually reinforcing objectives. The sustainability goals of the Farm to Fork Strategy, such as the reduction in the use of pesticides and antimicrobials, directly contribute to long-term food safety. In particular, SDG 12 Target 12.3, which aims to reduce food waste, acts as a catalyst for optimizing HFS management systems throughout the value chain. The discussion highlights the challenge of translating political ambition into concrete and measurable actions in the daily operations of small and medium-sized enterprises.

It is concluded that sustainability should be viewed not as a trade-off, but as a factor that strengthens safety, requiring a concerted effort from all stakeholders and emphasizing the essential role of Environmental Health in overseeing and promoting this convergence towards a more resilient and equitable food system.

Keywords: sustainability; health; food; production; consumption

MILD TO MODERATE MUSCLE PAIN

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Mild to moderate muscle pain is usually caused by overexertion or muscle injury due to physical activity, poor posture, minor trauma, or muscle tension from stress. In more serious cases, it can result from an insufficient intake of minerals such as calcium and magnesium, as well as certain underlying diseases (e.g., fibromyalgia, poor circulation, sciatica). In some more serious situations, it can result from an insufficient intake of minerals, such as calcium and magnesium, as well as from some underlying diseases (e.g., fibromyalgia, poor circulation, sciatica, etc.).

The main symptoms are local or generalized pain or discomfort, which may temporarily limit certain movements and exercises. Pain often arises due to excessive physical exertion, repetitive movements, tension, and stress. When the muscle is subjected to a force greater than its capacity, injuries of varying degrees of severity may occur.

Some important non pharmacological measures are rest, stretching, and massage to prevent stiffness and scarring; the application of alternating cold and hot compresses to the area to help relieve pain and inflammation; and strengthening exercises to prevent injury. Some over-the-counter medications such as Paracetamol, Ibuprofen, Voltaren Emulgel, and Reumon Gel may also be recommended.

In conclusion, mild to moderate muscle pain is mostly temporary and easily resolved. Understanding the causes and taking appropriate care for muscle pain contributes not only to physical well-being but also to maintaining an active and healthy lifestyle.

Keywords: Muscle pain, physical exertion, injury, inflammation, treatment

HEARTBURN, FULLNESS (COMMONLY KNOWN AS INDIGESTION), AND FLATULENCE

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Heartburn (pyrosis) manifests as a retrosternal burning sensation caused by the reflux of acidic gastric contents into the oesophagus, due to dysfunction of the lower oesophageal sphincter or increased abdominal pressure. Symptoms include burning, regurgitation, and worsening after heavy meals or when lying down. Fullness (dyspepsia) is characterised by early gastric satiety, epigastric pain or burning, nausea, and distension. Flatulence results from excessive intestinal gases, a consequence of bacterial fermentation of poorly digested carbohydrates, leading to meteorism, belching, and abdominal distension. Non-pharmacological measures are essential and include avoiding large and fatty meals, not lying down immediately after eating, elevating the head of the bed, reducing the intake of alcohol, coffee, tea, chocolate, and soft drinks, quitting smoking, losing weight, chewing slowly, eating small portions, and identifying and avoiding trigger foods such as legumes and spicy dishes. Over-the-counter medicines recommended include antacids and reflux suppressants such as Rennie®, Eno®, Gaviscon®, Kompensan®, and Proton 20®, to be used after meals or at bedtime for short periods. For flatulence, Normatal® (activated charcoal) and Aero-OM® (simethicone) are indicated. Treatment should be temporary and discontinued if no improvement occurs within a few days. Adverse effects include diarrhoea, constipation, hypercalcaemia, and nausea. Omeprazole may cause vitamin B12 and magnesium deficiency with prolonged use. In summary, the correction of dietary habits is essential; medication should be used only as a complement, and medical evaluation should be sought if symptoms persist.

Keywords: Heartburn, fullness, flatulence, antacids

FLU AND COLD

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Flu and the common cold are very common viral respiratory infections, especially during the winter. Although they share some symptoms, they differ in terms of the causative agent, duration, and severity.

The flu is caused by Influenza A and B viruses and is characterized by high fever, muscle pain, headaches, cough, and nasal congestion, lasting on average two to four days. The common cold, on the other hand, affects the upper respiratory tract, lasts between seven and ten days, and manifests as a blocked nose, cough, sore throat, sneezing, and general malaise. Treatment is mainly based on non-pharmacological measures such as rest, adequate hydration, honey consumption to relieve cough, balanced nutrition, nasal washing with saline solution, maintaining a ventilated and humid environment, and applying cold compresses to reduce fever and discomfort.

Among the non-prescription medicines (OTC) used for the flu, analgesics and antipyretics stand out, as they help relieve pain and fever. These usually contain paracetamol, such as Cêgripe, Ilvico, and Trifeduo.

For the common cold, the choice of OTC medicines depends on the symptoms. Syrups such as Bisoltussin are used for dry cough, while mucolytics like Tussilene are indicated for productive cough. Nasal congestion can be relieved with Vibrocil Actilong, while sore throat and body aches can be treated with Strepfen Honey and Lemon and Ben-U-Ron, respectively.

In conclusion, both flu and the common cold can be treated with OTC medicines and simple measures, while vaccination and good hygiene are essential to prevent complications and promote health.

Keywords: Common cold; Flu; Self-medication; OTC medicines.

COUGH AND HOARSENESS

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Coughing is a physiological defense mechanism that allows air to be expelled suddenly from the lungs, helping to eliminate secretions or irritants from the respiratory tract. It is classified according to duration as acute, subacute, and chronic, and according to nature as productive, with expectoration, and dry, without mucus production. The most common causes include respiratory infections, chronic lung diseases, asthma, and smoking.

Hoarseness consists of a change in vocal tone and clarity. It can be functional, when there are no anatomical lesions in the vocal cords, or organic, when there are.

Non-pharmacological measures can improve symptoms. It is recommended to increase intake of warm liquids, rinse the nose with saline solution, humidify the environment, elevate the head of the bed during sleep, and avoid foods that aggravate reflux or irritants.

Pharmacological treatment depends on the type of cough. For dry coughs, antitussives such as dextromethorphan are used, which inhibit the cough reflex. For productive coughs, mucolytics and expectorants such as acetylcysteine and bromhexine are used, which reduce viscosity and facilitate mucus elimination. By treating the cough, we improve hoarseness, as they share many of the same causes. However, there are options that act only on this symptom, such as erysimum extract lozenges (Cantadrill®).

In short, coughing, as a defense mechanism, and hoarseness, as a symptom, can arise from various causes, and early diagnosis can prevent more serious situations. There are two types of cough, with different pharmacological and non-pharmacological treatment procedures.

Keywords: Cough, hoarseness, causes, treatment

EMERGENCY CONTRACEPTION

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Emergency contraception (EC), or the 'morning-after pill', is a method used to prevent pregnancy after unprotected sexual intercourse or contraceptive failure. It works by inhibiting or delaying ovulation and has no effect if pregnancy has already occurred. In Portugal, three emergency contraceptive methods are available, without the need of a prescription: Ulipristal Acetate pill (EllaOne®), Levonorgestrel pill (Norlevo®, Postinor®) and the Yuzpe Method (Tetragynon®). The Levonorgestrel pill is effective up to 72 hours after the unprotected intercourse and the Ulipristal Acetate pill is effective up to 120 hours after, being the most effective, especially in women with a body mass index (BMI) above 30 kg/m2. The Yuzpe method is less recommended due to its lower effectiveness and greater number of adverse effects. EC should be taken as soon as possible, ideally within the first 24 hours. If menstruation is delayed for more than five days, taking a pregnancy test is recommended. The main adverse effects include nausea, vomiting, headaches, abdominal pain, fatigue and menstrual changes. After taking the EC, medical follow-up is required to rule out a possible pregnancy and start a regular contraceptive method. The use of a condom is recommended for seven days after taking the pill and the timing of resuming hormonal contraception depends on the pill taken. EC is a safe and effective contraceptive measure for occasional use, but it should not replace regular contraception. Lastly it is essential to promote sex education, family planning and the use of dual methods of prevention.

Keywords: Emergency contraception, pill, pregnancy prevention, sex education

FEVER

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Fever is a complex physiological response of the body to different stimuli caused by various agents, such as viruses, bacteria, toxins, etc. It is characterized by an increase in body temperature above normal values (>37.5 °C). This increase in temperature stimulates the immune system, which in turn stimulates the thermoregulatory center in the hypothalamus.

This process is initiated by the action of exogenous pyrogens, which stimulate immune system cells, such as macrophages and dendritic cells, to release endogenous pyrogens, such as IL-6, TNF-α, and IFN-γ. These cytokines promote the production of prostaglandins by COX-2, which bind to receptors in the hypothalamic neurons, increasing heat production.

Although fever plays a key role in immune defense, favoring the inhibition of microbial growth and activation of host defenses, excessive or persistent values can cause discomfort and metabolic complications. It can be controlled through non-pharmacological measures such as maintaining hydration, avoiding activities that increase body temperature, and resting. At the pharmacological level, antipyretics such as paracetamol, ibuprofen, and acetylsalicylic acid can be used, respecting the recommended dosage and duration. These drugs are effective in symptomatic relief, but they also have adverse effects, especially gastrointestinal and hepatic, requiring responsible use.

Therefore, understanding the pathophysiology of fever and the proper use of antipyretics is essential for safe and effective therapeutic intervention.

Keywords: Fever, Pyrogens, Antipyretics, Pathophysiology, Thermoregulator.

DIARRHEA

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Diarrhea is characterized by the frequent evacuation of unformed stools. It may be related to a simple intestinal disturbance or may be a symptom of a more serious condition. It is classified as acute or chronic, depending on the duration of its progression. The signs and symptoms include liquid or soft stools, abdominal pain, flatulence, dehydration, among others. The most appropriate therapy can be chosen through an understanding of the pathophysiological mechanism. Osmotic diarrhea is caused by the accumulation of osmotically active substances in the lumen. The stools appear clear, watery, and show no inflammatory signs. The action of bacterial toxins, hormones, and laxatives causes the secretion of fluids into the lumen, leading to secretory diarrhea. This may be caused by certain intestinal diseases and is characterized by large, watery stools. Exudative diarrhea alters the process of water absorption due to intestinal lesions or infections, causing stools with blood and/or mucus, abdominal pain, fever, and urgency to evacuate. Diarrhea leads to the loss of nutrients and fluids; therefore, it is important to maintain good hydration and an appropriate diet, introducing light foods such as rice, banana, soup, and boiled chicken, among others. Good hygiene is also essential: hands should be washed regularly; contaminated water should be avoided; and basic sanitation and surface decontamination should be ensured. Over-the-counter medication such as loperamide may be used. The initial dosage is 4 mg (two 2 mg capsules), followed by 2 mg after each diarrheal episode. The maximum daily dose is 16 mg.

Keywords: Diarrhea; Pathophysiology; Non-pharmacological therapy; Causes; Treatment

MILD TO MODERATE HEADACHES

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Mild to moderate headaches are among the most common clinical complaints, and this pathophysiology is related to dysfunctions of the central nervous system. The pain may result from injury, inflammation, vascular changes or muscle tension, being associated with the release of chemical mediators such as serotonin and bradykinin and with neural hyperexcitability.

Treatment includes non-pharmacological and phamacological measures, highlighting stress control, adequate rest, regular physical exercise, relaxation techniques and a good sleep routine. Concomitantly, the most suitable over -the-counter medicines are paracetamol (500 mg), ibuprufen (200-400 mg) and acetylsalicylic acid (500 mg), all administered orally.

Paracetamol should be taken every 6-8 hours and must not exceed the maximum dose of 4g/day, must be taken with water, with or without food. Ibuprufen should be taken up to three times a day with an interval of 4-6 hours, the maximum dose is 1200 mg/day and it should be taken after meals. Acetylsalicylic acid may be taken as 1 or 2 tablets of 500 mg per dose, with an interval of 4-8 hours, the maximum dose is 3g/day and it should be taken after meals.

Treatment should not exceed three days, if symptoms persis, medical refferal is recommended, since each drug presents specific adverse effects, ranging from mild gastrointestinal symptoms to more serious complications such as ulcers or bleeding. In conclusion, the balanced combination of non-pharmacological measures and the appropriate use of medicines allows effective and safe control of headaches.

Keywords: headache; pain; nervous stimulus; over-the-counter medicines (OTC)