

# Poster Week 20/2023

# ABSTRACT BOOK



POSTER WEEK

**Escola Superior  
de Tecnologia  
da Saúde**

Politécnico de Coimbra

November 20<sup>th</sup> – 24<sup>th</sup> 2023

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# SCHEDULE

Calendário		Poster Week 20/2023			
	2 <sup>ª</sup> f 20/nov	3 <sup>ª</sup> f 21/nov	4 <sup>ª</sup> f 22/nov	5 <sup>ª</sup> f 23/nov	6 <sup>ª</sup> f 24/nov
8-9h					
9-10h			Fernando Mendes: 8P Curso: CBL UC: Imunohemoterapia Clínico-Laboratorial II	Cristina Santos: 6P Curso: Saúde Ambiental UC: Qualidade e Segurança Alimentar	Diana Martins: 11P Curso: CBL UC: Morfologia e Histotecnologia
10-11h				Cristina Santos: 7P Curso: Saúde Ambiental UC: Gestão Qualidade da Água I	Diana Martins: 11P Curso: CBL UC: Anatomia Patológica Sistemática I
11-12h				Rui Cruz: 4P Curso: Farmácia UC: Introdução à Farmácia	
12-13h					
13-14h		Célia Gomes: 1P Curso: Farmácia UC: Investigação Aplicada Farmácia			
14-15h	Jorge Baiteiro: 5P Curso: Farmácia UC: Introdução à Farmácia	Paulo Matafome: 6P Cursos: Dietética e Nutrição UC: Anatomofisiologia I		Jorge Baiteiro: 9P Curso: Farmácia UC: Tecnologia e Farmácia Galénica I	
15-16h	João Lima: 2P Curso: Dietética e Nutrição UC: Nutrição e Saúde Pública	Paulo Matafome: 4P Cursos: Farmácia UC: Anatomofisiologia I			Joaquim Pereira: 5P Curso: Fisiologia Clínica UC: Investigação Aplicada 2
16-17h					
17-18h					
18-19h					
19-20h					

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A10– A11	Nutrition and Public Health	Dietetics and Nutrition
A12	Applied Research in Pharmacy	Pharmacy
A13– A18	Anatomophysiology I	Dietetics and Nutrition
A19 – A22	Anatomophysiology I	Pharmacy
A23– A29a	Immunohemotherapy Clinical and Laboratory II	Biomedical Laboratory Sciences
A30– A35	Quality and Food Safety	Environmental Health
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A63 – A73	Systematic Pathologic Anatomy I	Biomedical Laboratory Sciences
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# ABSTRACTS



## ORPHAN MEDICINES

***Chloé Cruz, Cláudia Reis, Inês Simões, Mariana Valentim, Raquel Francisco***

*Instituto Politécnico de Coimbra, ESTeSC- Coimbra Health School, UCP-Farmácia, Coimbra, Portugal*

An orphan medicine is the one who intends to diagnose, prevent or treat a patologic who puts the life of a person in danger, it is chronically debilitated and which affects up to 5 in each 10 thousand people. They are designated this way because in normal conditions of the market, the pharma industry has minor interest in developing and commercializing medicines intended for a small group of patients, which is the case of these medicines. This lack of interest is due to the fact that this have a high cost and have a very small target audience.

A medicine to be considered orphan has to be analyzed by the COMP and approved by the CE. The number of orphan medicines has increased a lot in Portugal essentially in hospital environments, and for this, there has been an increase in expenses at SNS hospitals.

There are specific criterion for the designation of an orphan medicine, being able to split in 3: rarity of clinical condition (has to affect until 5 people in 10 thousand in UE); nature of clinical condition (scientific evidences or medical references who comprove to be a chronically debilitating disease, rare and who puts the life in danger); clinical advantages (offer a significant benefit to thosewho suffer from this patologic)

Some of the more expensive orphan medicines are the Ivacaftor, the Alglucerase, the Fator IX of coagulation and the Rucaparib.

**Keywords:** Treatment, orphan medicine, patologic

## SELF-MEDICATION

**Ana Francisca Veloso, Margarida Matos, Maria Inês Baptista, Matilde Marques, Matilde Gandarez**

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Self-medication is conceptualized as the practice of ingesting drug action substances without the advice or monitoring from a qualified health professional. Although without the necessary competence to assess its severity, the individual then decides the drug to be used, either on the recommendation from another unqualified person, such as friends and family, or by themselves, and thus begins a practice that can be quite harmful to the self-medicated person, when medicines are taken irresponsibly. On the other hand, when taken correctly, self-medication has advantages, because thus it is no longer necessary to go to a doctor to prescribe certain medicine for a not so complex disease.

Self-medication is visible in all age groups, being more recurrent in elderly age, due to the presence of more frequent symptoms at this stage of life, leading to the ingestion of drugs without assistance or supervision from a health professional.

Most users take non-prescription medicines on their own will, whether it is indicated by a non-medical health professional, or under the influence of a related, a friend or the internet.

Pharmaceutical guidance plays a vital role on the education of society with regard to the consequences of ingestion of certain pharmacological substances with no control, in order to minimize this practice as much as possible. World Health Organization data show that about 50% of prescribed medicines are indispensable or sold inappropriately, and about one third of the world population takes medicines inappropriately and uncontrollably.

**Keywords:** Self-medication, control, society, instruction, prescription

## NATIONAL VACCINATION PLAN

***André Matias, João Brandão, Miguel Ferreira***

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The Portuguese National Vaccination Plan (PNV), initiated in 1965, has been a cornerstone in reducing infant mortality and controlling diseases in the country. This program provides safe and effective vaccines with the goal of protecting the population. A notable example of its success is the eradication of smallpox in 1980 and the elimination of polio in Europe in 2002. It has evolved over the years, expanding from the initial 5 vaccines to 13. The vaccination schedule covers individuals from birth (such as the hepatitis B vaccine) to adulthood (boosters for tetanus and diphtheria), with specific doses for different age groups, including immunization against hepatitis, diphtheria, tetanus, measles, and other diseases. In addition to the PNV vaccines, some additional vaccines are recommended for specific risk groups, such as pregnant women. Adults are also encouraged to maintain booster doses, especially for tetanus and diphtheria. The effectiveness of the PNV is demonstrated through high vaccination rates and disease control. The program is continuously updated based on epidemiology and vaccine availability, ensuring the best possible protection, which fosters public trust in the PNV, a key element in its success. In conclusion, substantial vaccination coverage plays a crucial role in maintaining disease control and, in some cases, achieving disease elimination. In conclusion, this program is regularly reviewed and updated to ensure public health and enhance its effectiveness in combating diseases.

**Keywords:** Vaccines, immunization, control



## GENERIC DRUGS

***Ana Machado, Filipa Silva, Inês Antunes, Maria Carvalho, Rafaela Simões***

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Generic drugs are medicines that have in their composition, the same active substance, the same dosage, safety, efficacy, quality, pharmaceutical form and pharmaceutical indication of the original medicine that served as a reference. The generic medicine is bioequivalent and produced in the same way as the originator medicine.

Generic drugs have the same effect on the body and therefore have the same therapeutic benefits and risks as the original medicine. The biggest difference between generic drugs and original drugs lies in the excipients, which by their use, can lead to a change in color, shape, and taste. This type of medication has been on the market for several years, so its efficacy and safety are well studied. As they are significantly cheaper medicines, they become economically attractive to users and the NHS.

The share of use of these medicines has increased steadily, having surpassed, for the first time, the barrier of 50% of market share in Portugal: 51.2% in April, based on these figures, Apogen said that the use of generic drugs in our country has allowed savings of more than 5 billion euros since 2011.

In conclusion, generic drugs are a more advantageous choice, as they have the same efficacy and safety as original drugs, at a lower price and more accessible to everyone.

**Keywords:** Generic Drug, Originator Drug, Efficacy, Safety

## PLACEBO EFFECT OF MEDICATIONS

***Beatriz Martins, Diana Peixoto, Margarida Dias, Maria Inês Pinto, Mariana Fernandes***

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The placebo effect is a technical term used in situations where there is no real medication, but rather a psychological effect and it has increasingly been chosen as an option for the success of a therapy. First exhibited in 1799, the use of placebos as a treatment has received some criticism regarding ethical issues, as patients are being "deceived" because they are not receiving a medical treatment with pharmacotherapeutic properties. Regarding its effectiveness, it can be influenced by many factors such as the appearance of the pill, its color, the price, among others. This effect has shown to be more effective when the treatment is carried out not only by the user, but also by the professional. Each patient's ability to respond is influenced by psychological mechanisms that can be conscious or unconscious, from personal and cultural beliefs, expectations, previous experiences with healthcare, among other aspects. The higher the patient's expectations, the greater the chance of the placebo effect working. To this end, research was carried out to gather together the substantial concepts about the placebo effect, its definition, important features, its influence on the user, its usefulness to the pharmaceutical industry, therapeutic context, ethical issues, among many other aspects mentioned throughout this assignment. At last, if a patient benefits from a placebo treatment, it is easier to develop improvements in the quality of life and health of each person, no matter how small they may be.

**Keywords:** Placebo, psychological effect, pharmacotherapeutic properties

## PHARMACOVIGILANCE

**Ana Carolina Tai, Ana Nogueira, Anna Chaves Costa, Francisco Galvão**

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The pharmacovigilance is a set of actions that identify, evaluate, understand and provide adverse reactions to the use of a medication, that is an unwanted effect.

In Portugal the National pharmacovigilance system (SNF) was created in 1992 , which is regulated by the Medicines Risk Management Directorate of INFARMED, I.P. subdividing it in nine Regional Pharmacovigilance Units (URF). The pharmacovigilance is ensured by the National Authority for Medicines and Health Products, I.P.-infarmed. The function of infarmed, I.P. is to monitor the safety of medicines, identify possible adverse reactions, evaluate the benefit-risk relationship and implications for public health.

These actions aim to provide health professionals and citizens information about safety data and ensure that the medications on the market are effectively safe to use.

In order to improve the safety of medicines once they are on the market, there are means that can be used to report suspected adverse reactions. We have the emergency line, the SNS and the Portal for reporting suspected adverse reactions to medicines-Ram. When submitting the notification on the portal you will receive information back, if this doesn't happen then has been an error in the submission.

When reporting an adverse reaction, we must describe it, identify the medicine suspected of causing the unwanted reaction, and provide our relevant data such as age, sex and contact details.

Thus, through infarmed we can consume medicines that have a high level of safety.

**Keywords:** Pharmacovigilance, Infarmed, RAM

## PHARMACOGENETICS / PHARMACOGENOMICS

***Andreia Alves, Iara Caetano, Laura Cerveira, Maria Francisca Ferreira***

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Responses to medications are influenced by multiple factors, such as health status, environmental influences and genetic characteristics of individuals. Pharmacogenetics/Pharmacogenomics studies the genetic influences of individuals on responses to medications. Pharmacogenetics focuses on genetic polymorphisms, making it possible to increase the effectiveness of medications and reduce the occurrence of adverse reactions. The analysis of patients' genetic profile allows the optimization of therapeutic regimens, increasing the effectiveness of therapy and reducing problems related to drug safety.

The main advantages of pharmacogenetics are the optimization of treatment results through the analysis of the genetic characteristics of each individual, reducing treatment time and possible adverse reactions. This pharmacogenetic knowledge allows selecting the right drug, for the right patient, at the right dose.

However, in addition to the obvious advantages, There are also some impediments to the implementation of pharmacogenetics such as ethical issues due to the realization of pharmacogenetic tests, the lack of evidence regarding the advantages of their use and whether or not it is economically profitable to make an investment in this area.

To conclude, Pharmacogenetics is a science that aims to improve the effectiveness and safety of treatments, making them increasingly specialized and personalized, increasing adherence and success of pharmacological therapies.

**Keywords:** Pharmacogenetics, Therapeutic optimization, Genetic variability, Genetic profile, Adverse reactions

## CLINICAL TRIALS

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The clinical trial is an epidemiological approach capable of providing the the best evidence of a drug's safety and effectiveness.

Clinical trials are of great importance for improving scientific knowledge, for example in the treatment and discovery of diseases as well as their prevention. Most clinical trials test one alternative to a new intervention, but some expand to three or four and may include a placebo.

Testing medical treatments has two purposes: to determine whether they work well, which is called "efficacy", and to know whether they are safe enough. The benefits must outweigh the risks.

During the study, investigators recruit subjects with predetermined characteristics, administer the treatment and collect data on the subjects' health over a specific period of time. The data will include indicators such as vital signs, blood and tissue concentrations of the study drug, changes in symptoms and whether the condition treated with the study drug improves or worsens.

Through the use of clinical trials, it has been possible to evolve in terms of drug marketing, because through them we end up making new discoveries of drugs that will later be launched onto the market after undergoing an evaluation that allows this.

Clinical trials are divided into 4 phases: first administration in humans, first administration in patients, therapeutic efficacy, monitoring and safety assessment.

An experiment can be considered an application of the scientific method, especially the experimental phase, as it is designed to test a hypothesis and monitor and evaluate the results. The most common clinical trials evaluate new drugs, medical devices, biological products, psychological treatments or other interventions. Clinical trials may be necessary before regulatory authorities approve the marketing of an innovative product.

**Keywords:** Epidemiological approach, Security, Test, Monitor, Evaluate

## POLIMEDICATION

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Polimедication is the practice of taking multiple medications by each individuals. Generally, excessive intake is defined as the consumption of a minimum of 5 to 10 drugs. This includes not only prescription medications but also over-the-counter medications, supplements and herbal products.

Portugal is one of the countries with the highest per capita. Taking medications not only involves risks for the patient but also a greater responsibility for the SNS. As a individuals age, the use of medication increases, and this trend is more common in females.

The high use of drugs is primarily attributed to chronic health conditions associated with aging, such us blood pressure, diabetes, chronic obstructive pulmonary disease and many others. With the elderly population growin, the prevalence of polimедication is also on the rise. However, it`s important to note that polimедication is not limited to the elderly.

This misuse of medication can lead to several complications, including difficulties in adhering to treatment, forgetfulness (more common in the elderly population), financial challenges and even intoxication in extreme cases. Nevertheless, there are also benefits, particularly when the treatment and well-being of the patient are closely supervised by a doctor, which is essencial in such cases.

In conclusion, polimедication is a common practice, especially among the elderly population. Throughout this study, we have come to realize that there are more risks associated with this practice than benefits. Therefore, the use of multiple medications should only be pursued under the guidance and prescription of medical professional.

**Keywords:** Medications, elderly people, excess

## THE NUTRITIONAL PARADOX

***Gonçalo Rodrigues***

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**Introduction:** The relationship between undernutrition and obesity in developing countries is a complex and growing concern. In many developing nations, malnutrition remains a significant problem, with many people suffering from undernutrition and related issues like stunted growth, vitamin and mineral deficiencies, and anemia. This is often due to factors such as limited access to nutritious food, poor sanitation, and inadequate healthcare.

The paradoxical trend is the coexistence of undernutrition and obesity within the same communities and populations. This phenomenon is sometimes referred to as the "double burden of malnutrition" or the nutritional paradox. In such situations, individuals or families where some members may be undernourished while others are overweight or obese.

**Objective:** Analyze the relation between obesity, underweight, nutritional deficiencies, and its impact on health.

**Methods:** Research on [link.springer.com](http://link.springer.com) and [elsevier.com](http://elsevier.com) using the search terms " Nutritional " and " Paradox ". Publications prior to 2015 were excluded from the analysis.

**Results:** The nutritional paradox is a phenomenon that challenges our conventional notions about diets and healthy habits. It shows the complexity of the relationship between diet, health and disease and that factors other than nutritional composition play an important role in human health.

**Conclusion:** The coexistence of undernutrition and obesity creates a significant public health challenge. It's crucial for policymakers, healthcare providers, and communities to address this issue comprehensively by promoting access to nutritious foods, improving healthcare and sanitation, and increasing awareness about healthy dietary habits to break the cycle of malnutrition and address both undernutrition and obesity to ensure better health outcomes for all.

**Keywords:** "Nutritional" and "Paradox"

## **IODINE DEFICIENCY: A PUBLIC HEALTH ISSUE PARTICULARLY ON PREGNANCY**

***Lucas Carreiro; Duarte Ferreira; Pedro Martins; Janaína Varela***

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**Introduction:** Iodine, a trace element crucial for thyroid hormone biosynthesis, is vital for proper growth, organ development, and regulation of basal metabolic rate and body temperature. It's estimated that around 2 billion people worldwide are iodine deficient. During pregnancy, iodine inadequacy can lead to spontaneous abortion and affect children's mental health.

**Objectives:** Understand the impact of iodine deficiency particularly during pregnancy and its implications for maternal and fetal health.

**Methods:** This research was based on data from the World Health Organization and Portuguese Directorate-General for Health. Additionally, research was conducted on Google Scholar, using "iodine deficiency and portugal AND pregnancy and public health" as keywords. Among 664 articles from 2018 to 2023, 2 were chosen based on its title and proper analysis

**Results:** Iodine deficiency remains a significant challenge in public health. However, universal salt iodization has significantly increased global iodine accessibility. Pregnancy is a state of great demand for the health of both the mother and the fetus. During this period, iodine requirements are increased due to three essential factors such as increased production of T4, transfer of iodine to the fetus and increased renal iodine clearance. Therefore, it is imperative that adequate iodine intake is provided to support fetal brain development.

**Conclusion:** The ingestion of iodine rich food or supplementation if needed, is crucial to normalize iodine levels and guarantee correct fetal development. This overall deficiency is likely associated with a widespread lack of awareness on the topic among the general population.

**Keywords:** Iodine deficiency, pregnancy, iodine, intake, iodine deficiency portugal



## **CAMELLIA SINENSIS TEA FOR THE PHYTOTHERAPEUTIC TREATMENT OF TYPE 2 DIABETES MELLITUS - WHAT IS THE DOSE?**

**Rosa S. Ferreira<sup>1</sup>; Célia A. Gomes<sup>2</sup>**

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Introduction: Type 2 diabetes mellitus (T2DM) is a metabolic disorder that affects a large part of the adult population and results from insulin resistance. Tea made from *Camellia sinensis* leaves has shown beneficial effects in reducing the risk of T2DM, since its bioactive compounds increase cellular defense against oxidative stress by having an inhibitory effect on the enzyme's alpha-amylase and alpha-glucosidase. Several studies have been developed with the aim of revealing the mechanism of action of these compounds in the cellular process of DMT2, however, one of the questions for which there is still not much knowledge is the ideal dose of tea to enhance a beneficial effect in the phytotherapeutic treatment of DMT2.

Objective: The aim of this study is to determine the dose of *Camellia sinensis* tea in the treatment of T2DM according to studies carried out in different populations around the world.

Methods: A bibliographic search was carried out in the online databases PubMed, ScienceDirect, and Google Scholar, using the keywords "*Camellia sinensis*", "type 2 diabetes mellitus", "tea", "cohort study", "phytotherapeutic treatment". Articles with publication dates between 2008 and 2023 were selected.

Results and Conclusion: Phenolic compounds from *Camellia sinensis* leaves have been shown to be effective in treating T2DM, through various mechanisms. The different studies analyzed indicate that the necessary dose of *Camellia sinensis* tea for a therapeutic effect to be seen in the treatment of DMT2 consists of  $\geq 4$  cups of tea a day, while the consumption of  $\geq 3$  cups of tea daily already shows positive results such as a reduction in the symptoms associated with DMT2.

**Keywords:** "*Camellia sinensis*", "type 2 diabetes mellitus", "tea", "cohort study", "phytotherapeutic treatment"

## ENDOCANNABINOID SYSTEM

***Adriana Correia, Beatriz Azevedo, David Micaelo, Inês Belbute, Maria Santos, Pedro Freitas***

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The endocannabinoid system (ENS) regulates many of our bodily functions: learning and memory, eating, temperature control, emotional processing and sleep, to maintain an internal balance - homeostasis.

The ENS is made up of a network of chemical signals and cellular receptors. There are two cannabinoid receptors: CNR1 with expression in the central nervous system. CNR1 agonists increase food intake because of their orexigenic properties and activation of hypothalamic structures; CNR2 is mainly expressed in immune cells and peripheral tissues but is also in the thalamus and on the soma of dopaminergic (DA) neurons in the ventral tegmental area (VTA). Food intake is controlled by peripheral signals, reward and the homeostatic system (RS and HS). The HS modulates feeding behaviors through neurons controlled by peripheral signals. Hedonic eating is mediated by the RS, consisting of the VTA-DA projections to the nucleus accumbens, where motivational signals are processed, and to the prefrontal cortex, a region involved in inhibitory control.

$\Delta$ -9-tetrahydrocannabinol ( $\Delta$ 9-THC) is the psychoactive compound in the Cannabis sativa plant. A THC's effect on eating behavior is "munchies" - an intensified craving for food after cannabis consumption.

Studies indicate that 2-arachidonoylglycerol and N-arachidonylethanolamine (anandamide) via CNR1 binding stimulate food intake while oleylethanolamide may inhibit hunger.

"Hemp" is rich with polyunsaturated fatty acids (PUFAs) and bioactive phytochemical metabolites that nurture the ECS.

There are two major types of PUFAs: Omega-3s (abundant in the brain and retina, providing an energy source) and Omega-6s. Dietary supplementation with fish oil promotes specific modulation of the CNR2.

**Keywords:** endocannabinoid system, cannabinoid receptors, nervous system, food intake, hemp, PUFAs

## VITAMIN A

***Natasha Fonseca; Juliana Silva; Beatriz Santos; Ana Rita Pereira.***

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Vitamins are essential in our organism, most of them are obtained from our diet while others can be synthesized for our body. There are two types of vitamins: the water-soluble and the fat-soluble, for instance, vitamin A.

Vitamin A is soluble in lipids, but since it isn't produced in our body, we have to obtain it through our nutritional diet. This Vitamin can be obtained from animal sources, in the form of pre-formatted Vitamin A or retinol, and it can also be obtained from plant sources, in the form of Pro-vitamin or carotenoids. When this vitamin is ingested in the form of carotenoids, it must be converted into retinol or vitamin A.

This vitamin has several functions and benefits in the human body, being essential for vision and has antioxidant and immune system strengthening properties.

In terms of obtaining it from vegetables, this vitamin is present in: carrots, pumpkins, spinach and fruits such as mango. In terms of animal sources, it's present in dairy products, meat, liver and oily fish.

Note that both a deficiency (cause delayed in growth and development in children, infections risk and problems on vision level) and an excess (can cause intoxication, headache and defects in the formation of the fetus during pregnancy) of vitamin A in an organism can be harmful, highlighting the need for balance. The use of vitamin supplements should be done under the guidance of a nutritionist.

**Keywords:** Retinol, fat-soluble, balance, dairy diet, vision.

## VITAMIN C - IMPLICATONS IN THE PRODUCTION OF COLLAGEN

**Ana Julia Orosco; Alexandra Pires; Duarte Noro; Sara Saraiva; Scarlet Lugão; Soraia Rodrigues**

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Vitamin C, or ascorbic acid, is an essential water-soluble vitamin. It is found in fruits and vegetables, including broccoli, cabbage, parsley, and citrus fruits. Once absorbed in the small intestine it is transported quickly to the blood and distributed throughout the body's tissues. It plays a crucial role in many functions of the body, such as stimulating the absorption of iron, tissue growth, and repair, helping with healing, strengthening the immune system, and acting as a powerful antioxidant that combats damage caused by free radicals. Moreover, it is essential to produce collagen, which participates as a cofactor in Hydroxyproline, promoting the production of a collagen "web" through the enzymes Lysyl and Propyl Hydroxylases. It also plays a crucial role in the hydroxylation of lysine and proline in procollagen, which is necessary to produce healthy collagen fibrils.

However, the body does not store vitamin C for long periods, and it is easily eliminated through urine, making it essential to consume the recommended amount of 100 to 2,000 mg/day for healthy adults. Insufficient levels of vitamin C can cause scurvy, which affects the mesenchymal system causing symptoms such as sluggishness, tiredness, a general feeling of being unwell, mood changes, joint pain, weight loss, loss of appetite, and diarrhea. In rare cases, it can cause significant congestion of blood vessels, resulting in perifollicular hemorrhages and edema. However, excessive consumption can cause unpleasant symptoms, such as nausea and diarrhea, and can also interfere with the antioxidant effect of vitamin C.

**Keywords:** water-soluble; essential; iron; cofactor; antioxidant

## PHYSIOLOGY OF BONE CELLS: PTH, CALCITONIN AND VITAMIN D

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Calcitonin (CT) and parathormone (PTH) are complementary hormones involved in the acquisition and maintenance of bone mass and the regulation of calcium metabolism.

In this search, we analyze what is known about CT and PTH and the cells they target, namely osteoblasts, osteoclasts, and osteocytes.

Bone tissue is continuously remodeled by the concerted actions of bone cells, including bone resorption by osteoclasts and bone formation by osteoblasts, while osteocytes act as mechanical sensors and coordinators of the bone remodeling process.

This is possible because of the system Rankl/ Rank/OPG. Due to Rankl is necessary for the generation of osteoclasts.

Calcitonin regulates blood calcium levels and has clinically useful properties for preventing fractures. It inhibits osteoclast activity, reducing bone resorption, but its role in adults is less significant than that of PTH since other mechanisms also regulate calcium levels in the body.

PTH, in turn, improves the reabsorption of filtered calcium in the kidneys, decreasing the amount of phosphate reabsorbed, which increases the excretion of phosphate in the urine. It also stimulates the conversion of vitamin D into its most active form, calcitriol, which increases calcium absorption in the intestine. Both PTH and vitamin D help regulate bone growth and remodeling.

When blood calcium levels are low, PTH is released and stimulates osteoclasts, increases renal calcium reabsorption and promotes vitamin D conversion. Furthermore, PTH regulates the formation of vitamin D, for it to become active in the human body, it must pass through the kidneys.

To summarize, PTH and calcitonin play opposite roles in regulating bone metabolism, helping to keep blood calcium levels within the normal range. PTH stimulates bone resorption when calcium levels are low, while calcitonin inhibits bone resorption when calcium levels are high.

**Keywords:** Parathormone, calcitonin, osteoblasts, osteoclasts, osteocytes.

## OXIDATIVE STRESS AND ANTIOXIDANTS

***Carolina Coutinho; Carolina David; Leonor Rodrigues; Mariana Cruz; Martim Lacerda***

*Instituto Politécnico de Coimbra, ESTESC-Coimbra Health School, UCP-DN, Coimbra, Portugal*

Free radicals are molecules constantly being formed in the body, that contain an unpaired electron in the outer orbitals and are highly reactive in the body, but in excess they can have consequences. In these situations, our body is not able to protect itself from their effects, due to low levels of antioxidants. Therefore, maintaining the balance between the production of free radicals and antioxidant defenses is fundamental and involves several strategies, both enzymatic and non-enzymatic.

An antioxidant is a chemical or system that can safely interact with free radicals and stop the chain reaction before critical molecules are damaged.

High levels of oxidative stress can be harmful and lead to the oxidation of lipids, proteins and DNA, causing changes in their structure and functions. This phenomenon can be caused by air pollution, eating foods with chemical additives, stress, smoking and alcohol.

Thus, oxidative stress will contribute significantly to neurodegenerative diseases (Alzheimer's and Parkinson's), cardiovascular diseases (atherosclerosis and hypertension), chronic inflammatory disorders (rheumatoid arthritis and other autoimmune diseases) and in extreme cases, cancer.

Furthermore, oxidative stress is one of the main causes of aging in the body, especially on the skin, where it accelerates the appearance of wrinkles, blemishes and uneven texture.

Oxidative stress has been linked to many metabolic disorders due to unhealthy eating patterns. Most of the studies that have examined the association between diet and oxidative stress consider the effects of antioxidant supplements (vitamins and minerals) indicate that high intakes of macronutrients can promote oxidative stress and contribute to cell inflammation.

**Keywords:** Stress oxidative;Antioxidants;diseases,nutrition

## CHOLESTEROL, ENDOTHELIAL DYSFUNCTION AND ATHEROSCLEROSIS

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**Introduction:** Cholesterol is a type of fat or hormonal lipid that is essential for the functioning of the body. Endothelial dysfunction is associated with impaired tissue perfusion particularly during stress and paradoxical vasoconstriction of large conduit vessels including the coronary arteries. Atherosclerosis is a chronic inflammatory disease, which leads to a progressive narrowing of the arterial calibre.

**Objective:** Understand what cholesterol, endothelial dysfunction and atherosclerosis is and what causes them. Analyse the consequences.

**Results:** After analysing some articles, it is possible to find out that there are two types of cholesterol, good HDL, and bad LDL. When LDL levels in the blood are high, there is a greater risk of narrowing of the arteries, causing heart disease. These irregular intimate plaques that advance into the lumen of medium and large calibre arteries that leads to a progressive narrowing of the arterial calibre and tends to reach the elastic characteristics of the vessels are called atherosclerosis. Turbulent or non-laminar blood flow leads to endothelial dysfunction and inhibits the endothelial production of nitric oxide. Endothelial dysfunction appears to have detrimental functional consequences as well as adverse long-term effects. Some of the factors that cause endothelial dysfunction and atherosclerosis are systemic arterial hypertension, diabetes, obesity, high blood level, high cholesterol, and smoking. Endothelial dysfunction causes chest pains and increases your risk of heart conditions. Atherosclerosis can cause a heart attack, stroke, aneurysm, or blood clots.

**Conclusion:** Cholesterol, endothelial dysfunction, and atherosclerosis are linked together and related to the fat in the capillaries.

**Keywords:** Atherosclerosis, Endothelial dysfunction, LDL/ HDL cholesterol

## **PARKINSON'S DISEASE- L-DOPA**

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Parkinson is a chronic, neurodegenerative and gradual disorder that predominantly affects people over the age of 60. Parkinson can be divided into several types, however the parkinson disease(PD) only includes primary parkinson, which is subdivided in juvenil and early start. The diagnosis of this anomaly is done by a neurologist. In Parkinson's Disease, Lewy bodies, which are abnormal deposits of synuclein and are formed mainly in the black substance, affect motor function and cause brain damage, leading to the death of nerve cells.

The pyramidal pathways regulate voluntary movements, while the extrapyramidal pathways are responsible for involuntary movements. These are affected in PD because in the black substance, there is a degeneration of dopamine cells, which will cause an imbalance in their activities, leading to the loss of motor control and rigidity. The imbalance in the extrapyramidal pathways will have an impact on the pyramidal pathway, making it difficult to execute and control movements.

The typical anomalies are in the motor level though there's also symptoms that affect mentally and cognitively. Due to different degrees of development of the disease, a scale was made, which evaluates PD in five stages, with the treatment differing depending on the stage.

To alleviate the symptoms and slow down their development, certain drugs are used that affect the dopaminergic pathways, usually it contains substances that lead to the entry of dopamine in the brain, but the patient must be assisted by other health professionals.

**Keywords:** Parkinson, Levodopa, dopamine



## TREATMENT OF DEMYELINATING DISEASES

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Myelin refers to the kind of lipoprotein fat which constitutes the tissues that surround most of the nerve fibers. Those tissues are arranged in layers and build the myelin sheath, a membrane structure rich in glycopospholipids and cholesterol that is responsible for covering the axons and acting as an electrical insulator that allows the conduction of the nerve impulses along the neurons, quickly and accurately, and the connection between them. When the myelin sheath is damaged and unable to self-regenerate, the nervous functions cannot be reestablished, and several underlying nerve fibers can die. This process is called demyelination, and it can be caused by ischemic stroke, inflammations, nutritional or immunological disorders, abuse of alcohol, or even some medicines. Damage to the conduction of the nervous signals has consequences on sensation, movement and cognition.

Some examples of demyelinating diseases are multiple sclerosis, optic neuritis, acute disseminated encephalomyelitis and progressive multifocal leukoencephalopathy.

There is no healing for demyelinating conditions, but the growth can occur in damaged areas. However, it's generally thinner and not as effective. Studies are being made to find ways to increase the capacity of the body to produce new myelin. Most of the treatments for the demyelinating conditions decrease the immune response. The treatment involves the use of drugs that are disease modifying, some examples are immunosuppressants and immunomodulators.

People with a low level of vitamin D easily develop multiple sclerosis or other demyelinating conditions. High levels of vitamin D can reduce inflammatory immune responses.

**Keywords:** myelin, immune, multiple sclerosis, nervous signals

## ALZHEIMER'S DISEASE: CHOLINESTERASE INHIBITORS

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Alzheimer's disease (AD) is the most common type of disorder of dementia, characterized as a chronic progressive disease of the central nerve system that impacts cognitive functions and speech. The deficiency of cholinergics and neuron death is very much linked to the condition which is the loss of neurotransmitters and receptors dependent on acetylcholine (ACh) and the deposit of beta-amyloid ( $A\beta$ ) and neurofibrillary tangles (NFT), respectively.

The degeneration of cholinergic neurons and the consequent loss of neurotransmission represent one of the main causes of cognitive function deterioration. According to the cholinergic hypothesis, the reduction in acetylcholine synthesis is pointed out as the primary cause of the condition. One of the come up solutions is to increase the levels of cholinergic receptors in the brain by inhibiting the biological activity of acetylcholinesterase (AChE), an enzyme that plays a role in ACh degradation. Hence, AChE inhibition is a strategy to preserve ACh levels.

Besides the cholinergic hypothesis, neuron death is also associated with AD. The mutation of amyloid protein results in the deposit of  $A\beta$  and formation of senile plaques (amyloid cascade hypothesis) and deposition of abnormal filaments of tau protein consequently the development of NFT. However, the cholinergic hypothesis is more accurate.

The development of AChE inhibitors is being used as treatment for AD, as they can be natural, synthetic or hybrid based inhibitors. The treatment isn't a cure, but a limitation of neuron degradation. Thus, the degradation of cholinergics by cholinesterase causes a loss of neurotransmission, therefore, cognitive functions.

**Keywords:** Alzheimers; cholinergics; cholinesterase; inhibitors.

## PHYSIOLOGY OF DRUG ABUSE AND THE EFFECT ON THE CENTRAL NERVOUS SYSTEM

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The concept of drug abuse is explained by a situation in which drug use is voluntary causing adverse effects to the individual and those around the drug abuser. There are different drugs, each one with different particularities, most of them affecting the dopaminergic pathways, causing tachycardia, anxiety, hyperactivity, speech problems, lack of coordination, and mood changes. These symptoms can be associated with Central Nervous System (CNS) stimulants and depressants. The areas in which the brain stimulates responses to this type of substances are called the pleasure reward pathway (PRP), which includes the dopaminergic pathways of the ventral tegmental area (VTA), the limbic system, the mesocortical system, and the nucleus accumbens (NA) to the prefrontal cortex.

A first pleasurable stimulus in the dopaminergic neuron will send a signal increasing the amount of dopamine in the NA and the dopaminergic pathway will be activated. The amount of dopamine to bind to dopamine receptors enhances in the NA and this increase will be further higher, because the search for pleasure is proportional to a progressively consume. As a result, there is a progressive decrease in the number of dopamine receptors in the PRP. Reportedly, drug abuse resets the drug threshold for activating the PRP, making the NA less sensitive to its effects. Increasing the demand, the mechanism of drug abuse on PRP can eventually lead to dependence.

Concluding, drug abuse has several negative impacts on the brain, affecting the CNS, altering the individual's functionality and well-being.

**Keywords:** Drug abuse, Central Nervous System, Dopamine, Pleasure Reward Pathway.

## WHAT A BIOMEDICAL SCIENTIST SHOULD KNOW ABOUT TT VIRUS: BARRIERS TO AND RISKS FOR TRANSMISSION, AND POSSIBLE MITIGATION STRATEGIES

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Torque Teno Virus (TTV), a type of the Transfusion Transmitted Virus, is a non-enveloped virus with a small, circular, single-stranded DNA genome. It was first identified in 1997 in a Japanese patient with post-transfusion hepatitis of unknown origin.

The taxonomy is uncertain but, initially resembling Circoviruses, TTV was classified within the Circoviridae family but later reclassified under Anelloviridae.

TTV's transmission remains ambiguous, likely involving fecal-oral, blood, sexual, and parent-to-offspring routes. Laboratory assessment primarily relies on polymerase chain reaction (PCR) to amplify viral DNA, although the extensive genetic variability of TTV and its low serum viral load can challenge PCR sensitivity.

Antiviral treatments effective against enveloped viruses often have limited impact on TTV. However, immunoaffinity purification and rigorous heating methods applied to coagulation factors have shown greater efficacy.

TTV is frequently detected in patients with unexplained viral hepatitis and the general population. Extensive investigations have explored whether TTV, highly prevalent in healthy individuals, may contribute to hepatitis. Though initially feared harmful to the liver, various reports have linked TTV titer with increased serum alanine transaminase (ALT) levels.

There is no vaccine to prevent TTV infection. Universal measures such as thorough blood donor screening and precautions with body fluids are crucial. The imminent challenge lies in averting post-operative complications, particularly in transplant and immunosuppressed cases, where TTV can have a negative impact.

TTV has a global distribution with 40-70% prevalence, which increases with more sensitive detection methods. In Portugal, TTV's prevalence remains uncertain.

**Keywords:** TTV, Non-enveloped, Transfusion Transmitted, PCR, Hepatitis

## WHAT A BIOMEDICAL SCIENTISTS SHOULD KNOW ABOUT *BABESIA*: BARRIERS TO AND RISKS FOR TRANSMISSION, AND POSSIBLE MITIGATION STRATEGIES

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*Babesia* spp. are intraerythrocytic protozoan parasites that cause babesiosis. Ixodes ticks are the main form of transmission to vertebrates, including humans. Tick larvae are infected while feeding on the infected rodent. The protozoan enters the erythrocytes, leading to hemolysis and releasing microorganisms that invade other erythrocytes. Some forms of transmission are through blood transfusion, organ transplantation, and, rarely, congenital infection.

*Babesia microti* is the primary etiological agent of human babesiosis in the United States and *B. divergens* infections are more common in Europe.

There are no characteristic symptoms, although patients present fever, anemia, and jaundice. Splenectomized patients, the elderly, immunosuppressed individuals and those infected with HIV are at greater risk of developing severe disease.

Diagnosis is made by identifying *Babesia* in a peripheral blood sample, serology or polymerase chain reaction (PCR). Microscopy is the quickest and cheapest, but it is not very specific or sensitive.

Prevention measures consist of personal protection measures and avoiding endemic areas. To mitigate the risk of transmission associated with blood transfusions, it is imperative to implement routine testing, as the majority of donors are asymptomatic carriers, thereby increasing the likelihood of transmission.

There is currently no vaccine available. However, projects have emerged, such as Anti-tick vaccines to prevent Tick-borne diseases in Europe, which aims to identify tick antigens that can be used as vaccine candidates.

Despite the need to mitigate the risk of transmission, few options are available to prevent transmission through blood transfusions. New strategies include serological screening of donors in *Babesia*-endemic areas.

**Keywords:** *Babesia* spp., transmission, blood transfusion, prevention

## WHAT A BIOMEDICAL SCIENTISTS SHOULD KNOW ABOUT HEPATITIS G: BARRIERS TO AND RISKS FOR TRANSMISSION, AND POSSIBLE MITIGATION STRATEGIES

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Hepatitis G virus (GBV-C), first identified in 1995 through collaboration between Genelabs and Boehringer Co, is a single-stranded, enveloped RNA virus with positive polarity belonging to the Flaviviridae family. The detection rate of GBV-C in the population averages around 1.7% and is detectable across all ethnic groups.

The genome organization consists of 9,400 nucleotides and features a single open reading frame encoding two enveloped structural proteins (E1 and E2) in the 5' genomic region, followed by five non-structural proteins (NS2, NS3, NS4b, NS5a, and NS5b) at the 3' end. Viral replication of GBV-C appears to predominantly occur in T and B lymphocytes, while replication in hepatocytes is rare. In most cases, GBV-C infections are asymptomatic. The clinical significance of GBV-C infection remains unclear because it is often found in co-infections with other viruses, including hepatitis C virus, hepatitis B virus, and human immunodeficiency virus (HIV).

Hepatitis G virus can be transmitted through parenteral routes such as contact with infected blood, perinatal transmission, and sexual transmission. Specific high-risk groups susceptible to GBV-C infection include intravenous drug users, hemophiliacs, hemodialysis patients, individuals with multiple blood transfusions, unprotected relationships and offspring of mothers infected with GBV-C. As hepatitis G is a blood-borne infection, prevention involves avoiding any potential contact with contaminated blood. There is no specific treatment for any form of acute hepatitis. Patients should rest as needed, follow a balanced diet, and avoid alcohol.

**Keywords:** Hepatitis G virus, blood-borne infection, coinfections

## WHAT A BIOMEDICAL SCIENTIST SHOULD KNOW ABOUT YELLOW FEVER: BARRIERS TO AND RISKS FOR TRANSMISSION, AND POSSIBLE MITIGATION STRATEGIES

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Yellow fever is an infectious disease caused by yellow fever virus (YFV), a Flavivirus genus of the Flaviviridae family, transmitted by the infected *Aedes* and *Haemagogus* mosquitoes. This disease is found primarily in regions of South America and Africa. However, it is a highthreat disease and as such it shows an International spread risk, which could pose a threat to global health security.

The YFV has three transmission cycles: Domestic, Sylvatic or Semi-Domestic. The only way to transmit this virus is through vectors, and it has an incubation period of 3 to 6 days. The main symptoms of this illness are fever, loss of appetite, vomiting, nausea, headache, muscle pain and jaundice (yellowing skin) which can progress to liver disease.

The diagnosis is based on laboratory testing like in early stages Polymerase chain reaction (PCR) and ELISA and PRNT later stages, personal symptoms, and travel history. Nevertheless, it is difficult to diagnose it during the early stages and can even be confused with other pathologies such as malaria, viral hepatitis, leptospirosis, other hemorrhagic fevers, poisoning and contamination with other flaviviruses.

It's important to take preventive measures such as vaccination, vector control, and disease awareness. To date there hasn't been found a cure for this infection, however, it has been found that plasma exchange is an effective procedure to compensate for the damage caused by this virus.

**Keywords:** Yellow Fever, *Aedes*, *Haemagogus*, Vaccine, Jaundice

## WHAT A BIOMEDICAL SCIENTIST SHOULD KNOW ABOUT LYME DISEASE: BARRIERS TO AND RISKS FOR TRANSMISSION AND POSSIBLE MITIGATION STRATEGIES

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Lyme disease is a tick-borne disease caused by the spirochete *Borrelia burgdorferi* and transmitted to humans by infected Ixodes ticks. It was recognized in Europe more than 100 years ago and first reported in Portugal in 1989.

Ticks acquire the spirochetes by feeding reservoir hosts that transmit the pathogen when feeding on uninfected reservoir hosts, acquiring the capacity to transmit the pathogen to naïve hosts. The cycle of the vector is complex due to the diversity of *Borrelia* populations and reservoir hosts, which are the main determinants of human transmission. The disease can cause a range of symptoms, including erythema migrans, joint pain, and neurological complications if not treated early.

Diagnosis involves mainly serological assays, quantifying a specific antibody in the blood, but there are also more laboratory tests like cultures, detection of bacterial antigens, Nucleic Acid Amplification Tests (NAAT) or Next-Generation Sequencing (NGS). The treatment involves antibiotics such as doxycycline, amoxicillin, or cefuroxime, with additional options like intravenous antibiotics and pain relievers depending on the severity of symptoms. Additionally, the use of corticosteroids and the effectiveness of the Lyme disease vaccine are still topics of debate.

Nowadays, it is increasing its incidence and, consequently, its role in clinical practice, and there is evidence that it can be transmitted by blood transfusion, although the risk is low. It is advantageous to possess knowledge and mitigation strategies to prevent tick bites.

**Keywords:** Lyme disease, Tick-Borne Diseases, *Borrelia burgdorferi*, tests, transmission



## WHAT A BIOMEDICAL SCIENTIST SHOULD KNOW ABOUT CREUTZFELDT-JAKOB DISEASE (CJD), VARIANT CJD: BARRIERS TO AND RISKS FOR TRANSMISSION, AND POSSIBLE MITIGATION STRATEGIES

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Transmissible Spongiform Encephalopathies (TSE) or prion diseases are a group of rare and progressive neurodegenerative diseases that affect humans and animals.

Creutzfeldt-Jakob Disease (CJD) was the first TSE described in humans, arises due to the conversion of the normal cellular prion protein (PrP<sup>c</sup>), which is a glycoprotein that has undergone pathological conformational changes, into a pathological one (PrP<sup>sc</sup>). Consequently, there is an accumulation in tissues, mainly in the Central Nervous System. This leads to neuronal loss and an inability to develop an inflammatory response, giving the brain a sponge-like appearance. CJD can manifest sporadically, through familial inheritance, or via acquisition, which includes a different variant.

Variant Creutzfeldt-Jakob Disease (vCJD) was first described in 1996, in the United Kingdom. Generally, patients with vCJD present prominent psychiatric features like delusions, aggressiveness, anxiety, depression and others.

Magnetic resonance imaging, cerebrospinal fluid biomarkers, electroencephalography, radiological characteristics and PrP<sup>sc</sup> gene sequencing are essential for diagnosis.

The main route of transmission is the consumption of meat of infected cattle with Bovine Spongiform Encephalopathy (BSE), but it can also occur by genetic transmission and medical procedures. However, 3 cases of contamination via blood transfusion were also described.

Although there is no treatment for vCJD, prevention is essential, such as periodic inspection of cattle to detect BSE, destroy or use rigorous disinfection methods for materials that come into contact with infected tissues, refuse donations of blood or other tissues for transplantation from people who have been exposed to CJD or vCJD and the slaughter of infected cattle.

**Keywords:** Transmissible Spongiform Encephalopathies, Creutzfeldt-Jakob Disease, PrP<sup>c</sup>, PrP<sup>sc</sup>, Variant Creutzfeldt-Jakob Disease

**WHAT A BIOMEDICAL SCIENTIST SHOULD KNOW ABOUT BACTERIAL CONTAMINATION ASSOCIATED WITH SYMPTOMS SEPSIS: BARRIERS TO AND RISKS FOR TRANSMISSION AND POSSIBLE MITIGATION STRATEGIES**

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Sepsis, a life-threatening condition triggered by an uncontrolled immune response, is a significant concern due to bacterial contamination which can result from hospital-acquired infections arising from risks that individuals are exposed to.

According to the behavior adopted by health professionals, there are always risks associated with transfused and transplanted patients, who need to do certain procedures and may be exposed to microorganisms, as is the case with blood collection or surgical procedures.

These risks are mostly associated with the commensal flora of our bodies, with an important emphasis on the skin, which in the event of a discontinuity in the skin or a venipuncture not done properly, microorganisms such as *Staphylococcus aureus* and *Staphylococcus epidermidis* can invade the bloodstream. However, immunosuppressed individuals, pregnant women and those with congenital diseases are highly exposed to agents present in the hospital environment.

With this in mind, there are various types of barriers and strategies that are standardized and help to minimize the risks associated with healthcare professionals, such as using sterile material and personal protective equipment, carrying out infection prevention training, and, in the case of transfusions, carrying out collections using aseptic techniques as well as blood cultures for screening. In the case of blood donations, it is crucial to collect blood using aseptic techniques and the clinical questionnaire, in order to prevent bacterial contamination of the blood derivatives receptor.

These strategies are essential to reduce the risk of sepsis in patients.

**Keywords:** Sepsis, Bacteria Contamination, Aseptic Techniques, Hospital-Acquired Infections, Blood Cultures

## WHAT A BIOMEDICAL SCIENTIST SHOULD KNOW ABOUT DENGUE: BARRIERS TO AND RISKS FOR TRANSMISSION AND POSSIBLE MITIGATION STRATEGIES

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Dengue is a disease caused by a virus named Flavivirus that infects the human species. Morphologically, the virus contains one nucleocapsid surrounded by a bilipidic membrane that anchors E and M surface viral glycoproteins. The Flavivirus genome is made of one simple chain of RNA of positive polarity.

To cause an infection, the dengue virus enters the human cells by endocytosis, degrading its own structure and releasing its genome. After that, the virus adheres to the surface of the endoplasmic reticulum and starts its maturation on the Golgi's Complex, releasing viral mature particles, causing infection on the other cells.

The main form of transmission consists in an Aedes mosquito bite, although it can also be transmitted by vertical transmission, contaminated blood and by exposure in healthcare services. Due to that, the major preventive measure to be taken is avoiding being bitten by the Dengue's vector, as well as being immunized through vaccination, performing good laboratorial practices and conducting a clinical interview before blood collection. In fact, dengue is an endemic disease, so it is essential to screen all potential blood donors who have been in these regions before carrying out a blood transfusion.

The symptomatology is similar to other viral infections, but there can also be pain around the eyes, internal bleeding and red skin stains. However, most cases are asymptomatic.

Dengue diagnosis involves physical exams, tourniquet test, serological tests, and blood tests, but targeted Flavivirus therapy doesn't exist yet, so treatment relies on painkillers and antipyretic drugs.

**Keywords:** Dengue, Transmission, Prevention, Treatment, Virus

## FOOD SAFETY AND THE CONSUMPTION OF SUSHI AND SASHIMI - CONSUMER PERCEPTIONS

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Foodborne illnesses represent a serious public health problem. Sushi consists of "rice garnished with other food ingredients, including raw seafood, which may or may not be wrapped in seaweed and served in pieces". Sashimi is food consisting of "raw seafood fillets". Without any kind of heat treatment, its consumption can cause poisoning and infections. Therefore, greater control is needed in harvesting areas, in the use of certain fish, and in the implementation of mandatory freezing steps.

The main objective of this study is to understand consumers' perceptions of food quality and safety when eating sushi and sashimi and their level of information about the risks associated with eating these dishes.

For the article, we analyzed various platforms, such as scientific articles related to the topic under study, and used a questionnaire.

Through the survey of the general population, we can see that the majority of respondents recognize the risks of eating sushi and sashimi, such as "foodborne infections" (75% of responses) and "transmission of parasites" (69.1%). A total of 86.8% of respondents believe that it is possible to reduce these risks by taking extra care with "proper hand hygiene" (81.4%) and "proper hygiene of the cooking area and utensils" (91.5%).

We can thus see the importance of Environmental Health Technicians, both in implementing prevention processes and measures to promote food quality and safety, and in raising awareness and educating the population on the subject.

**Keywords:** Health, Safety, Sushi, Quality, Food

## FOOD AND SUSTAINABILITY

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In a world in constant evolution, the relationship between food and sustainability becomes increasingly worrying. Sustainable food refers to a food system that seeks to meet present nutritional needs without compromising the ability of future generations to meet theirs. It involves practices that minimize environmental impact, promote biodiversity and contribute to the long-term health of society.

This work aimed to investigate the eating habits of the Portuguese population and their relationship with sustainability, so that we can identify the challenges of the current food system and suggest changes that promote sustainability.

The methodology used was a bibliographical review on the topic and the application of a questionnaire.

Through analysis of the results, it was found that the majority of respondents (85.6%) associate the concept of sustainable food with lower environmental and social impact, however a significant portion (37.8%) still do not consider this criterion when choosing to feed. The sustainable practices adopted by respondents, such as reducing waste, purchasing local products and using reusable bags, indicate a growing interest in incorporating more sustainable habits. However, the financial barrier, highlighted by 72.8%, suggests that making sustainable food more accessible is crucial for more widespread uptake.

In short, the study points to a growing awareness about sustainable eating, however it is important to address economic barriers, improve information about sustainable choices and promote more conscious practices to move towards a more environmentally friendly diet.

**Keywords:** Food; Sustainability; Eating habits; Financial barrier; Accessible.

## FOOD WASTE

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Food waste is a concept very present today in the daily life of the population, being a major obstacle that must be overcome, since it encompasses economic, environmental and social costs. It was the objective of the work to discuss, comment and advise the importance of addressing this issue, given that food waste is a problem on a global scale.

The realization of this work was aided by articles, scientific websites and the application of a questionnaire to the general population where it was intended to evaluate the level of knowledge of the population regarding waste and whether they are concerned and take measures to combat food waste. With the application of the questionnaire to the population, it is concluded that most of the people who answered are aware of how important it is to adopt measures to increasingly reduce food waste.

Thus, according to the results of the questionnaire, in order to contribute to the change in food waste, to a better family economy and thus help eradicate hunger, attention should be paid to some aspects of our daily lives, such as: knowing how to interpret the expiration dates (69.7%), reuse leftovers (92.4%), arranging new techniques for the use and confection of food (95.5%), modifying eating habits by opting for organic and fresh food, rich in vitamins and minerals (51 individuals) and increasing confidence in agricultural producers (77.3%).

It is essential to combat the situation of inequalities in access and consumption of food, which implies sensitizing the population to a change in attitudes and behaviors in promoting the fight against food waste.

**Keywords:** Waste, combats, measures, economy, consumption

## FOOD QUALITY AND SAFETY FOR HIGHER EDUCATION STUDENTS

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Food, beyond being a fundamental human necessity, is one of the elements of lifestyle that most affects people's health. The habits developed during university life tend to persist into adulthood, so it is necessary to ensure food quality and safety in order to promote a more balanced diet.

The objectives of this work are to assess the eating habits of university students through the administration of a questionnaire and identify potential factors that influence them.

With a total of 39 responses, we were able to verify that 97.4% of the respondents stated that they usually consume meals at home, while 30.8% do so in cafeterias or dining halls, which may be associated with the cost of social meals at universities and the economic resources of the Portuguese population. Most respondents reported consuming an average of 3 meals per day (41%), with the remaining 4 (38.5%) and 2 (10.3%) respectively. The most common response regarding the time spent on lunch was 30-60 minutes (51.3%). We were also able to conclude that the eating habits of students are inadequate, given the below-recommended consumption of fruits and vegetables, as 35% of students admit to consuming these types of foods only once a day.

Therefore, we emphasize the need for changes in certain eating behaviors of students and that educational institutions play a crucial role in promoting healthier lifestyles to contribute to a more sustainable and productive future.

**Keywords:** Eating Habits, Higher Education Students, Food Education, Healthy Lifestyles

## **FOOD SAFETY: GOOD PRACTICES IN THE MOMENT OF PURCHASE, PRESERVATION AND CONSUMPTION OF CHILLED AND FROZEN PRODUCTS**

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Food safety is of the utmost importance in the food sector, guaranteeing a healthier lifestyle. This requires the prevention of contamination throughout the chain of production, processing, storage and distribution of food, especially refrigerated and frozen products, which are sensitive to temperature.

The aim of this study was to evaluate population's knowledge of good practices in the purchase, storage and consumption of these foods.

A bibliographical survey was carried out on the subject and a questionnaire was administered to the general population.

The results show that the majority of respondents (97.67%) value food safety in their daily lives, but there are still gaps in this practices.

Hygiene manners in the preparation of frozen and chilled food are correctly applied, with a lack of understanding about the proper defrosting process (59.02%) and storage in the fridge does not follow a proper order in many cases. When buying this products, some people do not adopt good practices, such as checking the expiration date (77.78%) or placing products in the appropriate places (63.89%). The majority of respondents recognize the risk of food poisoning associated with eating poorly defrosted meat in relation to *Salmonella* (79.07%) Therefore, it is crucial to follow proper defrosting and hygiene practices when handling raw meat.

This study highlights the importance of food safety and the need for education on safe practices. The Environmental Health Technician plays a vital role in promoting food safety, educating the community and ensuring compliance with regulations, contributing to safer and healthier food.

**Keywords:** Food safety, frozen food, refrigerated food, good practices, hygiene, storage, *Salmonella*



## FOOD SAFETY IN THE USE OF LUNCHBOXES

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The factors that contribute to food-borne diseases are related to inadequate behavior and practices such as, improper cooking and storage temperatures, contaminated equipment and incorrect personal hygiene.

Lunchboxes are a way of providing adequate nutrition in line with a healthy lifestyle, and sometimes at a lower cost to the population because, when you eat with a lunchbox you can prepare your own meal or choose to buy one from a restaurant.

The aim of this work is to raise awareness among the public about good food safety practices in the use of lunchboxes and how to use lunchboxes while complying with food safety rules.

To develop this work, we carried out a literature review on the subject and administered a questionnaire to the general population.

Through the questionnaire, 79.1% use glass lunch boxes; we also found out that there is a lack of information among the population regarding the safe temperature at which food should be kept, which only 11% answered correctly, "> 63°C for hot meals and < 5°C for cold meals" and 62.6% not knowing; 78% answered correctly that "Some types of plastic contain BPA, a chemical compound that can be released when plastic is exposed to heat".

We can conclude that the use of lunchboxes is becoming increasingly common, for reasons of practicality and for monetary reasons, although there are some issues that the population is not well informed about, in general they know about good practices for using lunchboxes.

**Keywords:** Lunch boxes; good practices; questionnaire; temperature; diseases.

## WATER FOOTPRINT

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Water is present in domestic use and it's the main basis for the production of consumer goods, as it's present both in the industrial sector and in food production (agriculture). Therefore, recognizing the importance of water and using it rationally is everyone's duty.

The water footprint is an indicator of water use that considers its direct use by a consumer or producer, and also its indirect use. The water footprint of a product is the volume of water used to produce that same product, measured along the entire production chain. Understanding the population's behaviors in relation to the use of this natural resource is essential to develop effective strategies for this resource to be properly managed.

This work aimed to evaluate the water footprint of the general population, having been elaborated through the analysis of scientific articles and the application of a questionnaire.

The results obtained in this questionnaire reveal that the population still doesn't have much knowledge when it comes to the water footprint concept, so only 28.3% of the respondents are aware of this concept, however they consider water resources important. In addition, 81.3% of these respondents say they turn off the tap while brushing their teeth.

So, we conclude that there is still much to improve in the daily life of the population in order to reduce the amount of water used, so, it's essential to raise awareness and educate the public about the importance of the water footprint and the need to adopt more responsible practices in relation to water use.

**Keywords:** Water, natural resource, awareness, water footprint

## WATERBORNE DISEASES

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Waterborne diseases are those that develop due to contamination of the water we consume or use. They cover a wide range of illnesses, including diarrhea, cholera, hepatitis A, among others. These diseases are often associated with populations that have limited access to safe sources of drinking water and adequate sanitation.

Water contamination can occur in various ways, either by pathogens or by chemical pollutants. Ingesting or coming into contact with contaminated water can result in serious infections and illnesses, especially in children and individuals with weakened immune systems.

To combat water-borne diseases, it is essential to implement preventative measures and proper water treatment. In addition, hygiene education plays a crucial role in promoting safe water and food handling practices. Adequate sanitation, including sewage treatment and access to sanitary facilities, is also fundamental.

In order to carry out this work, we based ourselves on an analysis of scientific articles on the subject of the work and then collected data in a brief questionnaire with the aim of gaining an idea of society's habits and knowledge.

After the questionnaire was made available, 53 responses were obtained. According to the data observed, most of the people questioned (71.7%) were aware of what Waterborne Diseases are and 81.1% answered that they had confidence in the quality of the water in their home.

Constant monitoring of water quality is necessary to identify and mitigate risks, guaranteeing safe water for human consumption.

**Keywords:** Diarrhea, Cholera, Hepatitis A, Water, Water Treatment.

## WATER POLLUTION AND CONTAMINATION

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In Portugal, the Portuguese Environment Agency (APA) is responsible for implementing environmental policies with a purpose of ensuring sustainable water management and the protection of water resources.

In order to evaluate the general population's knowledge of this issue, we decided to do a simple questionnaire to know how people are aware of water pollution and contamination, while also carrying out a theoretical review.

With this work, 119 people were covered and with the answers to the 6 questions posed, we were able to see that there existed just a little knowledge about this subject.

The questions where low literacy was most evident was the question regarding the concept of good quality water, which received many incorrect answers, 41.2% in total, however, regarding the question about what are the main causes of water pollution and contamination, in general, we can infer that the majority have an idea about the subject, since the correct answers were those that obtained the highest percentage. We can still infer that a large part of the population practices measures that contribute to the existence of good water quality, as many of the practices presented represented choices made by participants in the questionnaire.

With this way of approaching the population, we believe that in addition to obtaining data on knowledge, we are also fostering interest in this subject and promoting environmental health literacy.

**Keywords:** Pollution, Contamination, Water Quality, Population, Water Management

## IMPLEMENTATION OF BEST PRACTICES IN THE USE OF WATER FOR HUMAN CONSUMPTION

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Water is a human right. No one should be denied this access. The implementation of good practices in the use of water for human consumption is essential for the conservation of this vital resource and to ensure safe and potable water for all we have to follow some guidelines, reduce water waste, reuse water, that is, use it for tasks where it is possible to use non-potable water, the water must be treated correctly to eliminate contaminants and we must also protect the catchment areas of water, avoiding polluting activities in the vicinity.

The objective of this study was to evaluate the sustainable water management practices of the general population and to raise awareness about the importance of drinking water and the good practices associated with its use, promoting learning about its conservation and protection.

To carry out this work, a literature review was carried out on the subject and a questionnaire was applied to the general population.

We found that only 20.5% of respondents indicated agricultural activity as the sector that uses the most water, but all mentioned that it would be possible to optimize the use of water in agriculture. They also mention that a form of sustainable use of water would be the possibility of using rainwater.

We can conclude that sustainable water use practices are very important for the conservation and preservation of the planet.

**Keywords:** Water Consumption, Water Waste Reduction, Reusing Water, Contaminants Elimination, Protecting Catchment Areas

## WASTE OF WATER - GOOD PRACTICES AND ENVIRONMENTAL IMPACTS

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Water, considered one of the world's most important resources, is indispensable to all forms of terrestrial life. It is a fundamental resource for human and economic activities, thus contributing to the development of human societies. Its scarcity poses not only serious threats to society, but also to the economic stability of countries.

The main aim of this study was to raise awareness of the importance of wasting water, as well as its environmental impacts, and to disseminate good practices for reducing waste. To carry out this work, we relied on a theoretical review of scientific articles. In order to monitor the population's water consumption, we opted to draw up a questionnaire to obtain data in order to achieve the objectives, in which 41 people took part.

According to the data observed in the questionnaire, the majority of respondents (97.6%) are aware that water is an asset that needs to be preserved. This is reflected in their concern about water consumption, where 48.8% of people are concerned about this issue and take measures to save water. One of these measures is to avoid immersion baths, where 80.5% of respondents say they don't take immersion baths.

In short, there should be greater awareness of water wastage, so that the entire population has access to it and can reach it successfully, thus preventing environmental problems such as water scarcity; various ecological imbalances; water prices; social and military conflicts and also damage to human and animal health with the consequent registration of diseases and malnutrition, placing environmental well-being as a priority factor.

**Keywords:** environment, consumption, essential good, management, water resources

## THE LEVEL OF CONSUMER CONFIDENCE IN TAP WATER

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Water is a limited resource, however, it is indispensable and essential to human life. The quality of water for human consumption has been registering, year after year, constant and sustained improvements, reaching, in 2021, the value of 98.96% (98.85% in 2020) of safe water in the consumer's tap.

This work aimed to assess the level of consumer confidence in the quality and safety of water supplied by Portugal's public supply system.

To carry out this work, a literature review was carried out on the topic and a questionnaire was applied to the general population.

It was found that only 52.4% of respondents said they consumed tap water. However, 78.2% report that drinking tap water is not harmful to their health. When asked about the level of confidence in the water, 70.9% indicated a level of confidence in the range of 7 to 10. For 40% of respondents, the reasons for not consuming tap water were "unpleasant taste" and 37.5 % prefer to consume bottled water.

The availability of quality and quantity of water is fundamental for economic activities in Portugal. Decree-Law No. 44/2017, of 19 June, in Portugal aims to ensure the supply of sufficient quantities of good quality surface and underground water, as necessary for a sustainable, balanced and equitable use of water.

**Keywords:** water quality, tap water consumption, level of consumer confidence, water system supply.

## INFLUENCE OF FIRES ON WATER QUALITY

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Forest fires can affect water quality in the long term. This can result in increased water turbidity, as well as the deposition of ashes and other sediments in bodies of water. Forest fires can have a significant impact on water quality through their influence on the hydrological cycle.

This article aims to contribute to scientific knowledge about how forest fires affect water quality and provides relevant information for the management and conservation of water resources in fire-prone areas.

The study on the influence of fires on water quality was conducted in several stages, involving an interdisciplinary approach that combined field data collection methods, laboratory analysis and modeling, selection of study areas, data analysis and statistics, and more. The study highlights that the results related to the impacts of forest fires on water quality can vary depending on various factors, including the severity of the fires, geographical and ecological characteristics of the affected areas, and the extent of contamination. However, some general trends include: Increased water turbidity due to soil erosion and the entry of suspended materials after fires. Changes in water pH, making it more acidic due to the entry of organic acids and substances released during burning. Increased concentrations of nitrogen and phosphorus due to leaching of nutrients from the burned soil. Water contamination by toxic chemicals from burned materials. Negative impact on aquatic fauna, including fish and other aquatic organisms' mortality rates. The possibility of long-term effects on water quality, depending on the extent of the damage. Significant variation in results between study areas due to specific local factors. Additionally, the study includes the findings of a community questionnaire, indicating that many individuals are not aware of the consequences and impacts of fires on water quality (50,0%). However, they demonstrate knowledge about fire prevention in their areas (66,7%) and recognize the importance of protecting water quality in burned areas or areas at high risk of fires (83,3%). The community is also aware of the impact of fires on local wildlife, flora, and the economy (100,0%).

It is, therefore, essential to further educate the population on this topic to ensure a general understanding of the preventive measures that should be taken and the consequent risks of fires.

**Keywords:** water quality, fires, environment



## GOOD MANUFACTURING PRACTICES

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Good Manufacturing Practices (GMP) are a set of guidelines initially introduced by the World Health Organization (WHO). These standards focus on ensuring the quality, safety, and efficacy of pharmaceuticals, founded on essential principles to minimize risks.

According to GMP, medicines must consistently exhibit high quality, be suitable for their intended use, and comply with market authorization or clinical trial requirements. GMP encompasses all facets of drug manufacturing, from raw material selection to stringent quality control.

The WHO-published GMP guidelines serve as international recommendations, adaptable to specific national conditions. In the European Union, the European Medicines Agency oversees compliance with these guidelines, contributing to international cooperation with authorities outside the EU, such as the Food and Drug Administration in the United States.

Quality is often imperceptible to consumers through their senses, making testing alone insufficient to guarantee quality. To create an effective quality assurance system that ensures no approved medicines are dispensed until their quality is confirmed as acceptable, it is imperative to adhere to regulatory standards, maintain thorough documentation, use appropriate materials and facilities, and have qualified personnel. Regulatory compliance allows products to gain approval from regulatory authorities, granting access to global markets.

Furthermore, robust systems are needed to verify and swiftly collect potentially defective products from the market.

Good Manufacturing Practices play a vital role in the pharmaceutical industry and public health. Therefore, it is crucial that medicines are manufactured under GMP regulations to certify quality is integrated into the design and manufacturing process at every stage.

**Keywords:** Good Manufacturing Practices, Quality Assurance, Regulatory Compliance, Safety, Efficacy

## IMPORTANCE OF THE LABEL IN PHARMACY

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Drug labels are a communication strategy for the pharmaceutical industry. Pharmacies, medical clinics, hospitals and laboratories all need special, impeccable labels for the healthcare sector. It is necessary to use safe and innovative labeling materials that comply with pharmaceutical and health industry regulations. Some of the requirements to be considered are resistance to high temperatures, humidity, contact with chemicals and packaging storage methods.

The packaging and labeling of medicines must be accurate to ensure patient confidence and well-being. The label indicates what is being purchased, what the product can offer the consumer and how to use it to obtain the expected results. It also provides the necessary information on storage conditions and shelf life.

Labeling is essential for the safety of every person who depends on it. It allows us to go further in the quality of the pharmaceutical industry and even further in the quality of care for patients and consumers.

Each and every label has regulations that must be adhered to, at the risk of making a small mistake.

**Keywords:** Label, communication, trust, consumer, safety

## VAGINAL TABLETS

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There are several drug administration routes, with the oral route being the most commonly used. However, other types of routes have emerged that may even be more effective. The vaginal route is one example.

Drugs administered through this route must conform to the characteristics of the vagina. There are various pharmaceutical forms for vaginal administration, such as ointments, solutions, creams, gels, tablets, suppositories, or rings.

For local absorption to occur, the drug is released from its respective pharmaceutical form and interacts with vaginal fluid. This local action also has greater efficacy and lower toxicity. In the case of systemic absorption, the structure of vaginal tissue allows the drug to be absorbed into the bloodstream due to its high vascularization.

As mentioned earlier, these drugs must meet certain criteria, such as vaginal pH, enzymatic activity, vaginal microflora, cyclic changes, and the composition and characteristics of vaginal fluid.

Among the different available pharmaceutical forms of this medication, vaginal tablets are the preferred option. A vaginal tablet does not undergo first-pass hepatic metabolism because the vaginal mucosa has high vascularity and permeability to certain drugs. This results in greater drug bioavailability in the bloodstream.

In conclusion, there are several reasons why the use of vaginal tablets has been increasing. The tablet offers numerous advantages, and considering all these benefits, this pharmaceutical form is one of the most commonly used therapies for conditions where it is one of the alternatives.

**Keywords:** Vaginal tablets, vaginal mucosa, pharmaceutical form

## THE COLORING OF MEDICINES

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The coloring of medicines is important and necessary in terms of safety, improved appearance and greater therapeutic adherence. Colorants are colored products of natural or synthetic origin. They must be non-toxic and pharmacologically inactive, and should not be added to injectable or ophthalmic preparations.

There are soluble dyes (water-soluble/liposoluble) and insoluble dyes, where pigments (mineral or organic) and lacquers (precipitation of a water-soluble dye by an aluminum or calcium compound) are integrated.

Coloring is used to improve the patient's acceptance of the drug; dyes that are similar in tone to the skin are added to topical preparations so that the product is less visible after application; dyes added to products for oral use must match the respective taste.

According to the general rules, they should be used in concentrations as low as possible and sufficient for the intended purpose. For natural, synthetic or organic colorants, the acceptable daily dose (0.1 to 7.5 mg/kg) for an internal use formulation should be taken into account. In solution form, it is advisable not to exceed a concentration of 100 ppm and in suspensions and emulsions 200 ppm.

As for packaging, labeling and storage, they should be packaged in suitable, tightly closed containers, labeled with the common name along with the respective percentage and stored away from light and moisture. In conclusion, colorants are extremely important in the manufacture of medicines and are also a mainstay in administration.

**Keywords:** Colouring, Medicines, Administration

## RECTAL CAPSULES

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The rectal capsules are soft gelatin capsules whose composition is identical to the oral capsules and they can be found in elongated or pyriform format. The process of absorption, normally, occurs quickly but there are many factors that affect the speed of the drug liberation. The capsules which contain liquids tend to be more rapidly absorbed than the ones that contain solid particles. When wet, this type of capsules liberates the drug in a controlled and gradual way so that it is absorbed by the lining of the rectum and then enters the bloodstream. The process of production of the rectal capsules is quite simple, it involves 4 important phases. Those 4 phases are the production of the gelatin, the preparation of the pharmaceutical formulation for the filling, the encapsulation and lastly, the drying. Rectal capsules are especially used: in pediatrics, in cases of swallowing difficulty, gastric irritation, fainting or vomiting, food restriction and medical examination. The advantages of these capsules include dosing accuracy, easy administration, shorter liquefaction time, fast drug release, reduced disaggregation time, quick and favorable absorption when compared to suppositories, better stability, and conservation in warm climates. In conclusion, rectal capsules are a practical form of drug administration, usually as an alternative to the oral administration or when a local effect is desired. Soft gelatin capsules have been shown to be advantageous over suppositories, as they have a faster action and greater stability during storage.

**Keywords:** Rectal capsules, soft gelatin, absorption, rectal administration

## STARCHY CAPSULES

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Starch capsules, in the past, began to be distributed in the 19th century. White in color and made with starch or starchy flours of various origins, they have a rounded or oval leaf shape, flattened at the margins and concave in the center, intended to receive medicines. They consist of a two-part casing that varies in shape, size and nature, and it is inside that medicinal substances can be found. In the middle of the 20th century, they began to be forgotten, giving way to gelatinous capsules, which were better suited to industrial production, with greater stability, consistent dissolution and easy decomposition in the digestive tract, thus allowing the release of medicinal substances effectively.

For its preparation, there are 4 steps: choice of the excipient, weighing of the substances to be used with subsequent mixing. Finally, the capsules are filled with different types of encapsulators. Among the advantages of the capsules are the ease of handling and ingestion, as well as the quick release of their contents. They offer flexibility in dosing and an attractive presentation, with color and transparency options. On the other hand, the disadvantages of capsules are related to biopharmaceutical factors, such as the size and structure of the substances used, the type and quantity of excipients, which can influence the speed of therapeutic action. In addition, capsules with a concentrated dose can irritate the mucous membranes.

Lastly, capsules, throughout their evolution, have proven to be a crucial therapeutic form, and starchy capsules, in particular, have played a key role as the first in therapeutics.

**Keywords:** Capsules, starchy, therapeutic, excipient

## OVULES

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Vaginal ovules are pharmaceutical forms with a solid consistency and ovoid shape, to be introduced into the vaginal cavity by administration in single doses. Their dosage is usually higher compared to other routes of administration. Vaginal administration is widely used for healing substances, contraceptives, antiseptics and antibiotics. Medicines used in this route must not irritate the mucosa and special care must be taken with hand hygiene before applying the ovule. This should preferably be done at night, before going to bed, to ensure that it stays in the right place as long as necessary to be completely absorbed.

During ovules preparation, the excipients used must allow the prepared pharmaceutical form to melt in the vagina at 37 °C or to dissolve in the vaginal fluid. When the excipients do not meet the necessary qualities, specific adjuvants must be added to improve their properties. There are two main groups of excipients used in ovules preparation: lipophiles and hydrophiles. Lipophilic excipients are the most frequently used as they form a protective hydrophobic film on the mucosa. In short, ovules are once again gaining prominence, being widely used in certain pathologies, and are becoming increasingly important in the pharmaceutical industry due to their targeted location action.

**Keywords:** Ovules, galenic forms, medicines, vaginally

## WETTING AND SUSPENDING AGENTS

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Adjuvants or excipients are added to the active principle, promoting the stability of the medicine. Wetting agents and suspenders are examples of adjuvants used. Suspending agents are a set of compounds used to provide stability to suspensions. They function as protective colloids, that is, they create a film around the dispersed particles, increase the viscosity of the dispersing environment, delay flocculation, which is a delay in the formation of larger particles, and reduce the sedimentation speed of suspended particles. Furthermore, these agents must be harmless and must not present any pharmacological action. Surfactant agents, hydrophilic macromolecular substances, such as glycerin, insoluble inorganic hydrophilic substances and polysaccharides, such as gum Arabic, are examples of suspending agents.

Wetting agents or humectants act to reduce the contact angle between the solid surface and the water, providing an increase in the wettability of the particles. It is common in these preparations to combine suspending agents, as they complement the effect produced by wetting agents. Surfactant agents, such as benzalkonium chloride, and very hydrophilic macromolecules are examples of wetting agents.

The aim of suspending agents is to increase the viscosity of the dispersing phase, improving its stability. In wetting agents, their main purpose is to increase the speed at which the drug dissolves.

In conclusion, to choose the most suitable adjuvants for a given pharmaceutical form, the characteristics of the substances present and the possibility of interactions between the excipients and the active principle must be considered.

**Keywords:** Wetting agents, Suspending agents, Stability, Adjuvants



## PHARMACEUTICAL AEROSOLS

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Pharmaceutical aerosols have revolutionized drug administration, providing both efficacy and challenges. Pharmaceutical aerosols are suspensions of solid, liquid or gaseous particles in self-pressurized packaging, commonly made of metal, plastic or glass, for a non-invasive administration of respiratory medications. These are used in conditions such as asthma and COPD and include therapeutic devices such as inhalers, nebulizers and nasal sprays. They are also used in other industries such as cosmetics. Its mechanism consists of the propellant, canister, valve and concentrated product. The propellants generate pressure to expel the product, which can be liquefied or a compressed gas; the valve controls the quantity that is expelled, either it being in a measured or continuous dose and the product is the combination of active substance and excipients. There are several types of delivery devices for inhaled medication, such as metered-dose inhalers (most common, delivers precise doses of medication); dry powder inhalers (administers the medication in a dry solid state); nebulizers (less efficient, useful for prolonged administration in hospitalized patients); soft mist inhalers (suitable for patients who have a difficulty using metered-dose inhalers); nasal aerosols such as antihistamines, corticosteroids, decongestants and saline solution (for the treatment of localized diseases, such as rhinitis) and topical aerosols such as anti-inflammatories, antifungals and anesthetics (for dermatological conditions). In short, pharmaceutical aerosols are an effective way of administering medication, offering benefits such as direct and rapid release, less product contamination, immediate effectiveness, stability, systemic and local use, but with some limitations as the cost is higher, it has a risk of explosion and can be applied incorrectly.

**Keywords:** Aerosols, inhalers, respiratory diseases, pressurized devices, galenic form

## KAPOSI SARCOMA

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Kaposi Sarcoma (KS), discovered in 1994, is a low-grade mesenchymal tumor that involves the lymphovascular system. The four recognized variants are the classic, endemic, iatrogenic and AIDS-related that are distinguished by clinical aspects.

Research has found that KS is caused by the human herpesvirus-8 infection (HHV-8 virus) and that the virus has double-stranded DNA and an icosahedral capsid. Its gene products promote spindle cell proliferation and angiogenesis, and therefore may eventually lead to carcinogenesis. Studies have shown that HHV-8 is geographically distributed, with the highest seroprevalence rates in Africa (30-50%) and Mediterranean countries (10-30%), and lowest rates in the rest of the world, such as in Asia (2-4%) and American countries (5-20%).

Kaposi's sarcoma mainly affects the skin, but can also affect the mucosa or internal organs such as the stomach and lungs. Initially, the skin lesions appear as asymptomatic purple, pink, or red macules that may progress to blue-violet to black plaques and nodules.

The risk of developing Sarcoma Kaposi is higher on immunosuppressed patients, people infected with Human Immunodeficiency Virus (HIV) or diagnosed with Acquired Immunodeficiency Syndrome (AIDS) and people who had an organ transplant.

The diagnosis of Kaposi's sarcoma is made based on a medical history and physical examination, accompanied by a biopsy of the lesion, followed by histopathological analysis and, if necessary, immunohistochemical analysis. VHH8 DNA can also be identified through PCR.

The main objectives of existing therapy are the regression of the lesions, reduction of associated symptoms, and the prevention of disease progression.

**Keywords:** Kaposi Sarcoma; HHV-8; Angiogenesis

## CUSHING'S SYNDROME

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Cushing's syndrome (CS), characterized by the overproduction of cortisol, is associated with a diminished quality of life, increased morbidity, and elevated mortality rates. It's more common in adult women (between 20 and 40 years old). 1.2-2.4 cases per million per year in Europe and 6.2-7.6 cases per million person-years in the United States.

Early diagnosis is crucial in halting its progression. The clinical presentation can various symptoms, while many are common in the general population, including hypertension and weight gain. Distinctive features encompass a round face, upper back hump, stretch marks, easy bruising, hirsutism, menstrual irregularities in women, sexual difficulties in men, fatigue, muscle weakness, and an increased risk of fractures. Additionally, patients may suffer from high blood pressure, diabetes, heightened susceptibility to infections, and emotional symptoms like anxiety, depression, and memory problems. Identifying subclinical CS early is instrumental for prevention. CS remains intricate and necessitates ongoing patient monitoring.

A range of tests are employed, including late-night salivary cortisol, 24-hour urine free cortisol to creatinine ratio, low-dose dexamethasone suppression tests, and hair cortisol concentration. These diagnostic tools assist in identifying and confirming the presence of CS. For CS with a confirmed etiology, treatment should align with the underlying cause, as in the case of CS. Surgical intervention is the primary treatment. If surgical removal of the primary tumor proves unsuccessful, secondary treatment options include medical therapy, radiation therapy, and bilateral adrenalectomy. CS, marked by excess cortisol, demands early detection and tailored treatment for improved patient outcomes and well-being.

**Keywords:** Cushing's Syndrome, Hypercortisolism, Cortisol, Cushing's disease

## CARDIAC MYXOMA: DIAGNOSIS AND TREATMENT

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Myxoma is a benign tumor and the most common primary cardiac tumor in adults, typically located in the left atrium and with a higher incidence in females between 30 and 60 years of age. Its clinical manifestation depends on several factors, such as the relationship of the tumor with other cardiac structures, its size and growth rate, degree of mobility and tendency to cause embolism. Therefore, some of the most common symptoms are syncope, dyspnea, pulmonary edema and embolisms. Although there is no exact etiology known yet, myxomas can appear sporadically or be hereditary, associated with the Carney Complex.

Auscultation and electrocardiograms are not part of the diagnostic criteria for myxomas, since heart rhythm disturbances are common to other cardiac pathologies, but imaging exams such as echocardiograms, x-rays, magnetic resonance imaging and coronary angiography can help confirm the diagnosis. Surgical resection is the only effective treatment for cardiac myxomas and it has excellent prognoses of up to 96% long-term survival rate and a low recurrence rate, which occurs mainly in hereditary cases.

Regarding the histology we can observe lepidic neoplastic cells with myxoid stroma, frequently stellate with eosinophilic cytoplasm and indistinct cell borders, although the histology may differ between patients.

**Keywords:** Myxoma, Tumor, Dyspnea, Histology, Neoplastic, Cardiac

## FAMILIAL ADENOMATOUS POLYPOSIS

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Familial adenomatous polyposis (FAP) is a rare, autosomal dominant inherited disease caused by mutations in the APC (tumour suppressor) gene and characterized by the development of many (hundreds to thousands) precancerous polyps in the gastrointestinal tract and colon. FAP can affect both sexes equally. It is responsible for less than 1% of colorectal cancer cases and according to European Union registries the prevalence is estimated at 1/11,300-1/37,600.

The polyps may appear several years before the onset of symptoms, which makes it important to investigate family members and patients beforehand. Studies have shown that polyps are present for at least 10 years before symptoms appear. These polyps progress to colorectal carcinoma if they are not treated properly. The diagnosis should be made through screening or follow-up colonoscopies if more than one hundred adenomatous polyps are detected during the patient's lifetime. However, genetic testing for mutations in the APC gene is essential for a conclusive diagnosis. As far as treatment is concerned, periodic colonoscopies are the appropriate option. Subsequently, depending on the number of polyps, surgery is recommended to prevent the development of intestinal cancer.

Our aim is to provide more in-depth information on familial adenomatous polyposis, covering its epidemiology, pathophysiology, symptoms, clinical manifestations, diagnosis, surveillance, treatment, chemoprevention and, finally, prognosis.

**Keywords:** Colonoscopy, APC gene, adenomatous polyps

## CROHN'S DISEASE

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Crohn's disease (CD) is one of two main types of inflammatory intestinal disorders, characterized by chronic inflammation in the gastrointestinal tract, often affecting the terminal ileum and colon. There are various theories surrounding the origins of CD, including genetic factors, gut microbiome considerations, and exposure to environmental factors. A significant hypothesis suggests CD as an autoimmune condition. Five types of CD have been recognized: Ileocolitis, Ileitis, Gastroduodenal Crohn's disease, Jejunoileitis and Crohn's colitis which are categorized according to the affected region. The symptoms associated with this disease include chronic diarrhea, frequent abdominal pain, fever, weight loss and fatigue. However, symptoms differ among individuals depending on the location and extent of the inflammation.

Diagnosing CD involves assessing symptoms, medical history, abdominal evaluation, blood tests, stool samples, imaging, and procedures like colonoscopy, biopsy, and capsule endoscopy to help the diagnosis. Risk factors include genetics, location, smoking, antibiotics, and diet. Ethnicity, immune issues, and environmental factors also contribute.

Prevention isn't certain, but lifestyle and stress management, follow-ups and medication can increase the prognosis, which varies with the disease's severity, treatment and complications.

The incidence of Crohn's disease is increasing globally, with higher prevalence in developed countries, impacting all ages, primarily 16 to 40. While gender incidence is similar, some studies suggest higher female prevalence.

Currently, there is no cure for CD. Therefore the treatment targets inflammation and symptom relief with steroids, antibiotics, immunomodulators, monoclonal antibody therapies and surgery. It also depends on the disease severity, clinical factors and patient risk stratification.

**Keywords:** Crohn's disease, Colon, Inflammatory intestinal disorders, Colonoscopy

## TERATOMAS: DIAGNOSIS AND TREATMENT

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Teratomas arise from the abnormal differentiation of primordial germ cells and can occur in children or adults. Histologically, it contains ectoderm, mesoderm and endoderm and can be gonadal or extragonadal. The most common location is in the sacrococcygeal region, followed by the ovaries, testicles and brain. Most occur sporadically and the etiology remains unknown, although a higher familial incidence and female predominance have been described. The risk factors include infertility, alcohol use disorder, irregular periods and others.

Teratoma is classified based on degree of cellular differentiation, the mature teratoma or dermoid cyst, which accounts for 95% of cases, is generally benign, the immature is a cancerous form and the rare highly specialized teratoma is composed of a single type of tissue.

There is no macroscopic pattern, however, it may contain hair, teeth, muscles and bones. There are usually no early symptoms, but when they develop can include pain, swelling, bleeding and elevated levels of the hormone beta-human chorionic gonadotropin and alpha-feroprotein, which can be measured through blood tests.

Ultrasound, biopsy, radiography, bone scans, computed tomography and magnetic resonance are essential for diagnosis.

The treatment depends on their location, size and stage. In most cases, there is surgical removal, even if it's not malignant, since it can cause damage. Radiotherapy and chemotherapy such as PEB, which contains the drugs cisplatin, etoposide and bleomycin, are also implemented. There is no way to prevent the teratomas from appearing, but treating them in the primary stages can greatly reduce the risk of complications.

**Keywords:** Teratomas, Germ Cells tumor, Gonads, Hormone beta-human chorionic gonadotropin, Alpha-feroprotein

## EPIDERMODYSPLASIA VERRUCIFORMIS

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Epidermodysplasia Verruciformis (EV), also known as Tree Man Syndrome, is an autosomal recessive hereditary skin disease that was first described in 1922 by Lewandowsky and Lutz.

This disease is characterized by a mutation in the *EVER1/TMC6* and *EVER2/TMC8* genes, which translates into an inability of the immune system to develop an adequate immune response, making individuals more susceptible to infection by certain types of beta Human Papillomavirus ( $\beta$ -HPV), such as HPV5 and HPV8.

The appearance of flat brown papules, raised warts and seborrheic keratosis lesions are the main clinical features of this condition and are typically found on sun-exposed areas of the skin like the extremities and the face. In fact, sun exposure is a risk factor for the development of malignancy, with 30-50% of patients developing skin cancer, namely Spinal Cell Carcinoma (SSC).

EV can be detected using single-stranded conformational polymorphism analysis, Polymerase Chain Reaction (PCR), In Situ Hybridization (ISH), skin biopsy and immunohistochemistry with anti-HPV antibodies.

Microscopically, the EV shows mild hyperkeratosis, bluish-gray cytoplasm, moderate acanthosis, characteristic large keratinocytes and prominent keratohyalin granules.

Although there is no effective treatment for EV, some described treatment modalities include cryotherapy, topical imiquimod and 5-fluorouracil, systemic retinoids, alpha interferon, and photodynamic therapy with 5-aminolevulinic acid. The treatment of choice for SCC is surgical excision. Additionally, preventive measures play a crucial role, such as minimizing sun exposure and employing photoprotection methods.

**Keywords:** Epidermodysplasia Verruciformis, *EVER1/TMC6*, *EVER2/TMC8*, Human Papillomavirus, Spinal Cell Carcinoma



## ECTOPIC PREGNANCY

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Ectopic pregnancy alludes to the implantation of the egg outside the uterine cavity, which can appear in the fallopian tubes, ovary, cervix, abdominal cavity or cervix and it affects 1-2% of pregnancies. Symptoms appear between the 4th and 12th weeks of pregnancy, causing severe pelvic pain and vaginal bleeding or even hemorrhagic shock and tubal rupture. Some of the risk factors include salpingitis, intrauterine contraceptive devices, endometriosis, previous placenta previa, congenital uterine anomalies and smoking.

Macroscopically we can see a dilated tube with a distended wall and in the lumen coagulum, embryo and chorionic villi. Therefore, in a microscopic view extrauterine chorionic villi or extravillous trophoblast is observed; we can also find fetal tissue and reactive alterations in the mesothelium.

The importance of an early diagnosis increases the maternal survival rate and it is relevant to make a differential diagnosis from other disturbances like spontaneous abortion, ruptured corpus luteum or appendicitis for a correct treatment. For this, a blood search for serum chorionic gonadotropin (b-hCG) is performed to confirm the pregnancy and a transvaginal ultrasound to locate the implantation site of the embryo, which may be a tubal or interstitial ectopic pregnancy in more than 95% of cases. After the correct diagnosis, there are different treatment options including methotrexate or laparoscopy, evaluating each case when choosing a proper treatment.

**Keywords:** Pregnancy, Ectopic, Obstetrics, Embryo

## ENDOMETRIOSIS: NEW CHALLENGES IN DIAGNOSIS AND TREATMENT

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Endometriosis is a chronic condition characterized by the presence of endometrial tissue outside the uterine cavity, causing internal bleeding, inflammation and the development of scar tissue, which leads to pelvic pain, accompanied by painful menstruations, often worsening than usual.

Endometriosis, affecting 10% of reproductive-age women, has an unclear origin, with retrograde menstruation as a leading theory, alongside other contributing factors.

Symptoms include pain during or after sex, bowel movements, and excessive bleeding. Diagnosing endometriosis is challenging due to its broad symptoms, often misdiagnosed with other conditions like irritable bowel syndrome or ovarian cysts.

It can lead to several complications, some of which will make natural pregnancy difficult. Therefore, in order to prevent it from worsening over time, an early diagnosis is crucial.

Endometriosis has no reliable diagnostic biomarker, relying on symptoms, ultrasound, and imaging. Current research focuses on genetic risk factors and metabolic activity, as both genetic and environmental factors cause endometriosis.

Through microscopic and macroscopic examination, it is possible to get a better understanding regarding its severity and extent. Additionally, both also play an important role in diagnosing and managing this condition.

Although there is no cure for endometriosis at this time, there are treatments that can lessen the symptoms, depending on how severe the condition is and whether or not pregnancy is desired.

Endometriosis significantly affects reproductive and sexual health, quality of life, and overall well-being. Urgent destigmatization and increased awareness among healthcare professionals and the community are critical to preventing delayed diagnosis and its consequences.

**Keywords:** Endometriosis, Early Diagnosis, Treatments

## HEPATITIS B: CHALLENGES IN DIAGNOSIS AND TREATMENT

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Hepatitis B is a viral infection caused by the HBV virus, a member of the Hepadnavirus family, discovered in 1965. Because of its long incubation period (30 to 150 days), the virus can be extremely harmful. It spreads vertically as well as through direct or indirect contact with infected blood and/or bodily fluids, dangerous sexual practices, and the exchange of contaminated objects. HBV can live outside the body for approximately 7 days. Approximately 5% of the global population carries the HbsAg, with a higher risk for males over 30 years old. Early symptoms include those similar to other viral infections, progressing to jaundice, dark urine, and light-coloured faeces. In advanced stages of infection, hepatocytes can undergo substantial cellular changes, resulting in cirrhosis and/or neoplasms. Histologically, extensive masses and nodules are observed in the liver, with cells similar to hepatocytes. On macroscopic evaluation, the following conditions should be assessed: fibrosis, cirrhosis, steatosis, cholestasis, congestion, portal thrombosis, necrosis, and macronodules. Prevention requires three doses of immunisation in early childhood, as well as adopting proper behaviours. Prophylaxis is indicated within the first 12 to 24 hours after exposure to dangerous behaviours. Serological, biochemical, and anatomopathological studies are used to make the diagnosis. There is no specific treatment for hepatitis B at the moment, but antiviral medications are indicated to minimise hepatic symptoms in chronic HBV infections.

**Keywords:** Hepatocyte, Infection, Diagnosis, Treatment

## BREAST STEATONECROSIS

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Breast steatonecrosis is a benign condition that involves adipose tissue lesions and causes chronic inflammation. The breast is an organ where adipose tissue is present, making it more prone to this pathology. Initial tissue damage can occur due to surgeries, anticoagulants, trauma, menopause, or radiation, and does not have confirmed association to cancer development. These can lead to fat release, forming oily cysts due necrosis of adipocytes, followed by calcifications and fibrosis accumulation, eventually leading to scar formation. The incidence of this pathology is in women aged between 37 and 48, although it can occur in women aged 50 and over with no clinical history. This lesion is an isolated, firm and painless superficial mass that may be associated with skin changes. It can be confused with various other lesions, through medical imaging or even clinical examination, such as palpation. For this reason, the clinician can require complementary tests or even a biopsy to diagnose the lesion. The correlation between clinical findings and medical history is also very important. There are no clinical indications to remove this lesion as it usually regresses and disappears over time. However, the degenerated fat and fibrotic scar may persist for years. Only in cases where there is associated pain or the lesion is present in an aesthetically unpleasant location is there an indication to remove it. These patients are followed up using medical imaging and clinical examinations because fat necrosis can hide an existing carcinoma.

**Keywords:** Breast Steatonecrosis, Benign Condition, Adipose tissue, Necrosis

## CYSTIC FIBROSIS

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Cystic Fibrosis is an autosomal recessive inherited disorder that is characterized by exocrine glands that release thick secretions caused by the lower production of CFTR-proteins, injuring tissues and organs such as the lungs, digestive tract, pancreas, liver and the reproductive system. It is the most frequent disease in Caucasians, with an incidence of 1/2500-3500 births, being similar in both genders. CFTR is an ion channel, activated by phosphorylation, located in the apical membrane of the epithelium, transports chloride and bicarbonate, promoting hydration. The most frequent mutation is delF508, which appears in 79% of cases, with 2000 variants for the gene that encodes the protein, only 242 causing Cystic Fibrosis. Abnormalities in this mechanism cause changes in the composition, volume and acidity of the respiratory milieu, due to the increase in reactive oxygen species and the deficiency of antioxidant molecules, which promotes chronic inflammation.

Diagnosis can be made at birth through the heel prick test or later through a clinical pattern of respiratory distress, persistent cough with thick sputum and lung infections. For confirmation, a positive sweat test and a genetic test of the typical mutations are required.

Although there is no cure, the therapeutic strategy is personalized to reduce the symptomatology and slow the progression of the disease. The most frequent treatments are based on the use of antibiotics, bronchodilators and corticosteroids, respiratory physiotherapy is also advised. In extreme situations, surgery is done. A new focus of therapeutics has been developed through genetic treatment.

**Keywords:** Cystic Fibrosis; Pulmonary Disease; CFTR; Mutation

## OSTEOGENESIS IMPERFECTA

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Osteogenesis Imperfecta (OI), also known as brittle bone disease, is a heterogeneous group of hereditary genetic disorders, which affects connective tissue like bones and it is caused by an abnormal type I collagen biosynthesis. It is a rare disease with many clinical implications such as skeleton fragilities, causing bone fractures, joint laxity and low bone density. Other manifestations are bluish sclera, short stature, deafness in adulthood and muscle weakness.

The genetic mutations that cause structural or quantitative deficiency of type I collagen will eventually affect the normal function of osteoblasts, producing an insufficient bone matrix. The ratio of normal structurally collagen to defect collagen will result in different phenotypes of disease, making the severity range from mild to lethal. The diagnosis of OI varies according to the severity of the disease. OI can be inherited mostly as a dominant disorder with mutations on *COL1A1* or *COL1A2* genes, responsible for the production of type I collagen. The diagnosis can be made during pregnancy, taking a sample from the umbilical cord and analyzing the collagen produced by fetal cells. After birth, the diagnosis can be made by examinations such as X-rays, genetic tests and biochemical blood tests.

The treatment of OI is based on three fundamental pillars: medical therapy, with the administration of bisphosphonates; orthopedic surgery, with the placement of intramedullary nails; and rehabilitation. This multidisciplinary process has been improving, for example with studies on TGF-beta inhibition, although there is still no cure.

**Keywords:** osteogenesis imperfecta, collagen type I, osteoblast, genetic mutations, bisphosphonates

## PYROPTOSIS

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Pyroptosis is an inflammatory and programmed form of cell death. Originally pyroptosis was deemed to be apoptosis because they share some characteristics, such as being caspase-dependent, presenting DNA damage and chromatin condensation. Afterward, it was observed that these were two different ways of programmed cell death. Pyroptosis is triggered by proinflammatory signals, thus being associated with inflammation. This type of cell death is seen primarily in inflammatory cells namely macrophages and it can be activated by intracellular or extracellular stimulation, including bacterial, viral, toxin and by chemotherapy drugs. For pyroptosis to occur it's crucial that the caspase-1 is activated and it may also require caspase-7. Caspase-1 is responsible for the maturation of proinflammatory cytokines such as interleukin-1 beta (IL-1 $\beta$ ) and IL-18, through pathways that are dependent on inflammasomes. Release of these proinflammatory cytokines is increased when cells are undergoing pyroptosis. Finally the cell can present pore formation, cytoplasmic swelling, leakage of cytosolic contents and it culminates in cell death. Pyroptosis can be related to a bundle of diseases such as nervous system diseases, infectious diseases, autoimmune diseases, cardiovascular diseases, and tumors. However the relationship between pyroptosis and cancer is not fully understood. In this review we will focus on the pyroptosis mechanism, where and when it occurs and which diseases are linked to this type of cell death.

**Keywords:** Pyroptosis, Cell Death, Inflammatory, Caspase-1

## THE LUNG MICROBIOME: IMPORTANCE

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The lung microbiome of a healthy human being comprises microbes that can be beneficial or potentially harmful, such as bacteria, viruses and fungi. The majority of them are symbiotic, where both the human body and microbiota derive benefits, while a smaller portion can be pathogenic, contributing to the development of diseases. In a well-functioning body, pathogenic and symbiotic microbiota coexist harmoniously in a low density but with an extensive biodiversity. In order to maintain its physiological purpose, the lungs must maintain a low bacterial burden to facilitate gas exchange. The functions of these beneficial microorganisms are to protect against pathogenic agents and to shape the immune system against external aggressions. The alteration of any of these characteristics will result in subsequent pathology, triggering, either the loss of bacterial diversity or prevalence of a single species or a small group of species. Not only the colonization by pathogenic agents but also the imbalance of microorganisms in a healthy microbiome might lead to an excessive reaction of the immune system, leading to an inflammatory state. Chronic obstructive pulmonary disease (COPD) is a valuable illustration of the evolving nature of the lung microbiome and its influence on the progression of respiratory disease. The lung microbiome holds the potential to harbor valuable diagnostic and prognostic information, and it is anticipated that the lung microbiome would become one of the useful biomarkers for respiratory diseases within clinical settings.

**Keywords:** Lung Microbiome, Microorganisms, Imbalance, Chronic Obstructive Pulmonary Disease, Inflammation.



## MYOCARDITIS: DIAGNOSIS AND TREATMENT

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Myocarditis is the inflammatory disease of the cells of the myocardium, the cardiomyocytes. Epidemiologically, who suffers most from myocarditis are male (82%) and young adults (average age: male 16-40; female 17-40). The most common features, although it may be asymptomatic, are chest pain, fever and dyspnoea. Suspected myocarditis can be diagnosed with electrocardiogram or a cardiovascular magnetic resonance. Endomyocardial biopsy, an invasive procedure, can also be helpful.

Several studies point to an association where myocarditis was found in 1.4-63% of endomyocardial biopsies (EMBs) from patients with heart failure, ventricular arrhythmias, and atrial fibrillation. Myocarditis may present in acute, fulminant, subacute and chronic forms and is heterogeneous in terms of clinical presentation. Its origin is also complex, since it can be caused by several infectious and non-infectious diseases, although viral etiology is considered the most common. Some patients recover rather quickly, while others can manifest complications like heart failure, dilated cardiomyopathy and heart arrhythmias. Anatomically, with the pathological mechanism of myocarditis, heart is more dilated because the atriums and ventricles increase. Tissue death can be a consequence.

Its treatment is based on 3 principles: Symptomatic treatment of the signs and symptoms of heart disease and any hemodynamic impairment; Anti-inflammatory treatment, such as the use of low-dose steroids and non-steroidal anti-inflammatory drugs (NSAIDs).

The use of immunosuppressants is not the most advisable, however they are useful in controlling symptoms such as pericardial inflammation or chest pain; Suppression of the etiological agents or inflammatory diseases that myocarditis has caused (antibiotics, antivirals, immunosuppression).

**Keywords:** Myocarditis, cardiomyocytes, inflammation, chest pain, heart failure

## VITAMIN D: A MAGIC BULLET OR A MYTH?

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Vitamin D<sub>3</sub> is a fat-soluble steroid produced in the skin, through exposure to ultraviolet irradiation of 7-hydrocholesterol; and it is present in nutritional products, also found in vitamin D<sub>2</sub> form. However, it is biologically inert, so it must be metabolized in the liver and the kidneys into its active form, 1,25(OH)<sub>2</sub>D. Vitamin D acts by binding to its nuclear receptor, VDR, which affects the transcription of target genes of cells that express VDR. The better known functions of vitamin D are its contribution to calcium homeostasis and bone mineralization through the intestinal absorption of calcium and phosphate, bone mobilization and reabsorption into the kidneys; along with its non-calcemic functions, highlighting its role in the immune system, apoptosis, cell proliferation, and differentiation. Excess levels of vitamin D can have toxic effects and lead to hypercalcemia, while insufficient levels appear to be prevalent alongside autoimmune diseases such as rheumatoid arthritis (RA), inflammatory bowel disease, and certain types of cancers. The vitamin D status and disease activity of RA patients were found to be inversely proportional, with a higher incidence of RA in low-latitude countries, a risk factor for this disease. Vitamin D supplementation was inversely associated with disease activity and resulted in better pain management, contributing to this condition's prognosis and mortality. Vitamin D modulates the immune response inducing tolerogenic phenotypes and decreasing the expression of major histocompatibility complex II. Vitamin D contributes to intestinal barrier integrity, preventing inflammatory bowel disease, and can also induce Crohn's disease remission

**Keywords:** Vitamin D, Auto immune diseases, Rheumatoid arthritis, VDR, Prognosis

## PSORIASIS: SYSTEMIC COMPLICATIONS

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Psoriasis is a chronic inflammatory, multisystemic disease, primarily affecting the skin and joints, and associated with an increased risk of comorbidities such as psoriatic arthritis, Crohn's disease, malignancy, obesity, and cardiovascular diseases. Psoriasis is relatively common, affecting approximately 1 to 5% of the global population, with a higher prevalence in individuals with fair skin (higher risk). Psoriasis commonly starts in individuals aged 16 to 22 and from 57 to 60 years old. 90% of affected patients have chronic plaque psoriasis, characterized by well-defined round or oval plaques. However, there are other more atypical types of psoriasis, such as guttate psoriasis, pustular psoriasis, erythrodermic psoriasis, and inverse psoriasis. The diagnosis of psoriasis is primarily clinical, with early detection being crucial, based on typical erythematous and scaly skin lesions. The plaques are usually located on the scalp, trunk, buttocks, and extremities, but it can occur anywhere on the body. These characteristics facilitate timely diagnosis. Many patients seek initial evaluation from their primary care physicians, as careful observation often yields the diagnosis. For more atypical presentations, a skin biopsy may be useful. Psoriasis has no cure, but therapies such as corticosteroids, vitamin D analogs, and tazarotene are useful in the treatment of mild to moderate psoriasis. More severe psoriasis can be treated with phototherapy or systemic therapy. Biological therapies, including anti-TNF-alpha, may be effective for severe psoriasis, but they have significant adverse effects and require regular monitoring. The treatment goals include improving lesions and quality of life.

**Keywords:** Psoriasis, Comorbidities, Chronic Inflammation, Therapies.

## MACHADO-JOSEPH DISEASE

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Machado-Joseph Disease (MJD)/Spinocerebellar Ataxia type 3 is one of the most common dominantly inherited ataxias worldwide and a polyglutamine neurodegenerative disease. This disease leads to a progressive ataxia due to dysfunction in the cerebellum and brainstem, although it entails many other clinical issues such as progressive dysfunction in the oculomotor system, peripheral nerves, pyramidal and extrapyramidal pathways and lower motor neurons.

The MJD pathogenesis mechanisms reside in protein misfolding and accumulation, as a result of an unstable CAG trinucleotide repetition on the chromosome 14q32.1, that varies in size among affected individuals, making it a very heterogeneous disease. This mutation encodes an expanded glutamine tract in the protein ataxin-3, a de-ubiquitinating enzyme, which will adopt an exacerbated amyloid-like structure. This protein will then aggregate and produce toxic substances that disturb several cell systems. A clinical diagnosis of MJD can be achieved through MRI findings presenting pontocerebellar atrophy characterized by a dilated fourth ventricle and basal ganglia anomalies. However, it can also be suggested namely in individuals with pyramidal signs, external progressive ophthalmoplegia, dystonia, bulging eyes and many other minor but important symptoms/signs. To date, there are no effective treatments for MJD, whereas the possible ones are applied with the goal of alleviating the clinical signs and symptoms and slowing down the progression of the disease. Therefore, the main approaches are aimed at the polyQ protein itself as well as its toxic downstream effects, and consist mostly of pharmacologic therapeutics, or even speech, occupational and physiotherapy.

**Keywords:** ataxin-3, Machado-Joseph disease, polyQ diseases, Spinocerebellar Ataxia

## HYPERTROPHIC CARDIOMYOPATHY

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Hypertrophic cardiomyopathy (HCM) is a cardiovascular disease whose primary cause is a genetic malfunction. The root of this pathology is caused by several different mutations that affect the coding of the cardiac sarcomere proteins, resulting in a deficiency in the muscle itself.

Microscopically, there is a noticeable hypertrophy of the cardiomyocytes that causes an increase of the myocardial mass, which translates into a macroscopic reduction of the ventricular cavities. The most common cause of HCM, is associated with left ventricular diastolic dysfunction. It is commonly asymmetrical with the most severe hypertrophy involving the basal interventricular septum adjacent to the aortic valve.

At an epidemiological level, this disease is more common in the United States of America among young people, with a ratio of 1 in 500 worldwide.

Diagnosis of this disease may be based on symptoms such as syncope or a heart murmur, particularly in individuals with a history of these symptoms or a family history of sudden death. The best non-invasive tests to confirm the diagnosis of patients with HCM include physical examination, ECG and complete echocardiographic assessment. Cardiopulmonary exercise testing as well as cardiac rhythm monitoring and cardiac magnetic resonance imaging can also help with the diagnosis. Since there are no pharmaceuticals that have been capable of decreasing the wall thickness or modify the natural course of the disease, HCM treatment is mainly targeted to manage the principal symptoms. The implantation of a pacemaker or defibrillator, or surgery is also an additional help to aid the patient.

**Keywords:** HCM, Cardiac, Genetic, Hereditary, Hypertrophy

## STEM CELLS APPLICATIONS – WHAT'S NEW?

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Stem cells are undifferentiated cells with the unique ability to multiply extensively and differentiate into various cell types, making them crucial in tissue and organ development and repair. Two main categories of stem cells exist: embryonic stem cells, found in early human embryos, and somatic stem cells, present in adult tissues for tissue repair. Stem cell transplants are widely used in treating conditions like leukemia, blood disorders, heart failure, spinal cord injuries, tendon degeneration, and type 1 diabetes. Transplantation methods include direct in vivo specialization within the patient's body and in vitro differentiation before transplantation. Cryopreservation of umbilical cord stem cells is another valuable therapeutic approach. Stem cells hold immense potential, particularly in regenerative medicine, but their usefulness relies on successful conversion into desired cell types. Ongoing research covers diverse areas, including hematopoietic stem cell transplants, alternatives to arthroplasty, fertility treatments, neurodegenerative disease therapies, pharmacological testing targets, cell-based therapies, and cellular programming for rejuvenation. Despite their promise, several challenges hinder stem cells from becoming the ideal medical solution. These obstacles include an incomplete understanding of stem cell mechanisms, issues related to efficient cell differentiation, and ethical concerns. Ongoing studies seek to overcome these hurdles and further unlock the potential of stem cells in addressing previously incurable diseases and medical conditions.

**Keywords:** Stem Cells, Therapy, Applications, Regenerative Medicine, Transplantation

## NEUROFIBROMATOSE

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Neurofibromatosis (NF) it's an inherited disease that follows an autosomal dominant pattern, being a neurocutaneous syndrome which is characterized by the growth of tumors in the nervous system who consequently form small external nodes (neurofibromes). These are mostly benign and can cause pain depending on their location. There are 3 types of neurofibromatosis caused by different genetic mutations, such as NF type 1, NF type 2 and NF type 3/Schwannomatosis. NF1 manifests itself since birth or early life, being the most frequent with an occurrence ratio of 1/3000. It's distinguished by brownish skin patches and iris spots (Lisch nodules), bone lesion and neurofibromes on the skin that tend to increase gradually. NF2 may appear during childhood, adolescence or adulthood and occurs in a ratio of 1/40000 and is identified by the presence of acoustic neuromas that cause imbalance plus hearing loss. NF3 is diagnosed in adults with age equal or superior to thirty years and it is identified by the appearance of schwannomas (benign tumours) located on the periferic nerves. Assintomatic NF3 population ratio is about 1/3. The diagnostic is done through a genetic test, upon suspicion that the disease might be present, detected by symptoms previously described on the skin. However, in the children, the diagnosis is harder to confirm, due to the disease being dormant and only ascertained in a more advanced age. There is no specific treatment, but neurofibromes that cause severe symptoms may be removed surgically. Malignant tumors, which are rare, may require chemotherapy and radiotherapy.

**Keywords:** autosomal dominant inheritance pattern, neurocutaneous, neurofibromes, tumors

## ASSESSMENT OF ARTERIAL RIGIDITY IN THE EARLY DIAGNOSIS OF ARTERIAL HYPERTENSION

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Hypertension is a chronic condition characterized by excessive blood pressure against the walls of the arteries, above levels considered normal. Arterial hypertension (AT) is defined when the maximum pressure is equal to or greater than 140 mmHg, or the minimum pressure is equal to or greater than 90 mmHg. AT increases the risk factors for cardiovascular complications such as stroke, heart diseases, and target organ damage, such as the kidneys. In Portugal, the prevalence of arterial hypertension in the adult population is estimated to be 42.6%. AT is predominantly asymptomatic, emphasizing the importance of measuring arterial stiffness in clinical practice for the diagnosis and preventive treatment of cardiovascular diseases. In middle-aged adults, assessing arterial stiffness allows for the early detection of vascular aging and enables early interventions to reduce cardiovascular risk factors. This approach plays a crucial role in the identification and appropriate treatment of AT, providing an opportunity to implement preventive measures and promote cardiovascular health.

Numerous studies assert that arterial stiffness is an independent risk factor for cardiovascular diseases and that increased stiffness can lead to the development of hypertension. This study aims to assess the relationship between arterial hypertension and arterial stiffness and correlate the presence of arterial stiffness in individuals who do not have hypertension but may be in the early stages of developing this condition. Therefore, early diagnosis and treatment of hypertension will be possible, thereby preventing cardiovascular damage caused not only by hypertension but also by increased arterial stiffness.

**Keywords:** Arterial Hypertension; Cardiovascular Diseases; Arterial Stiffness; Blood Pressure



## THE INFLUENCE OF DIFFERENT PHARMACOLOGICAL CLASSES ON THE AMBULATORY BLOOD PRESSURE PROFILE OF MEDICATED HYPERTENSIVE PATIENTS- MAP STUDY

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Arterial hypertension is a highly prevalent health problem in Portugal. Of the individuals who do suffer from this condition, a small number are medicated and a very small percentage of these patients have their blood pressure effectively controlled. Ambulatory blood pressure monitoring (MAPA) is increasingly recommended for clinical use to prevent the risk of cardiovascular events and provide clues to treatment strategies, rather than home blood pressure monitoring.

This therapeutic decision depends on the characteristics of the patients and their hypertension, which can influence the recommendation of lifestyle modifications and the decision to start or change medication.

When pharmacological therapy is necessary, various factors are considered, such as the patient's previous experience, risk factors, organ damage, contraindications, expense or cost, delivery and adherence, and after evaluating these parameters it is easier to decide on the ideal treatment. The main benefits of antihypertensive drugs are due to the reduction in blood pressure, and are generally independent of the drugs in use, except that certain associated cardiovascular conditions may favor certain classes of drugs. There are five main classes of drugs: thiazide diuretics; adrenergic blockers (alpha-blockers,  $\beta$ -blockers, peripherally acting adrenergic blockers); calcium channel blockers; angiotensin-converting enzyme inhibitors; and angiotensin II receptor blockers.

**Keywords:** Pharmacological Classes; Blood Pressure; Arterial hypertension

## **BLOOD PRESSURE VARIABILITY – STUDY BY AMBULATORY BLOOD PRESSURE MONITORING (ABPM)**

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The ABPM (Ambulatory Blood Pressure Monitoring) is a non-invasive technique that allows multiple indirect blood pressure (BP) measurements to be automatically obtained within a certain time interval, in this case, over 24 hours. Arterial hypertension is one of the main cardiovascular risk factors, being widely present in all age groups, a situation that makes its analysis extremely important. Arterial hypertension is defined by systolic blood pressure higher or equal to 140mmHg and/or diastolic blood pressure higher than or equal to 90mmHg. ABPM also provides detailed information over a 24-hour period on circadian variations, differences between daytime blood pressure and night time blood pressure, heart rate variability and pulse pressure.

This study aims to answer the question: could blood pressure variability contribute to a prognosis of the blood pressure profile? The answer to this problem will be made using the realization and subsequent analysis of the ABPM, with the target population being teachers at ESTeSC. When analyzing the ABPM results, variations in blood pressure will be observed, with regard to monitoring the circadian rhythm (average 24-hour blood pressure values, average daytime BP values, average nocturnal BP values and nocturnal progression of BP through evaluation and characterization of dipper, non dipper, extreme dipper and inverted dipper patterns) and pulse pressure, average heart rate and the existence or not of a morning peak will also be evaluated.

**Keywords:** ABPM, Arterial Hypertension, Blood Pressure

## HEART RATE VARIABILITY IN ATHLETES

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Heart rate variability refers to the variations in intervals between heartbeats (R-R intervals), it is influenced by the autonomous nervous system, thus being a good indicator of cardiovascular health while also providing information about the balance of the autonomous nervous system and the adaptability of the organism.

The relationship between heart rate and the variability of itself is important because the latter can reflect the capacity the autonomous nervous system has in adapting to different stimuli and situations, a higher heart rate variability is associated with a more balanced and resilient autonomous nervous system, on the other hand, a lower heart rate variability can indicate stress, tiredness, or health issues.

People who are physically fit due to practicing physical exercise have, in general, a lower resting heart rate variability due to the heart's capacity of pumping blood more efficiently. As a result of high intensity and duration of the exercise and the strain it places on the heart, an athlete's heart undergoes electrical, structural, and functional changes, making the sport and the longevity of its practice relevant factors to consider when studying athletes. After high intensity there is a decrease in resting heart rate variability values, indicating fatigue, while increased performance after a period of training is related to an increase in resting heart rate variability.

**Keywords:** Heart Rate Variability; Heart Rate; Autonomous Nervous System; Athletes; Physical Exercise;

## **INFLUENCE OF SHIFT WORK ON THE ARRHYTHMIC PROFILE OF HEALTHCARE PROFESSIONALS**

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In today's socioeconomics standard, shift work has become increasingly common, particularly shift work with rotating hours. Variations in the physiological pattern of shift workers, as well as their consequences for the individuals physical and psychological well being such as, mood changes, sleep disorders and heart arrhythmias, have been studied and documented on several past occasions. Even though it is not the most innovative topic, I consider the study of this phenomenon to be highly relevant, especially in healthcare, an area in which shift work has become more frequent and globalized.

The purpose of this study is to analyze the possible pathological EKG findings and arrhythmic tendencies in a group of health professionals, shift workers. The data collection will be through an ambulatory EKG, in other words, a 24 hours Holter recording, to these healthcare workers. Additionally it will explore the connection between the EKG findings and the type of shift, morning, afternoon or night.

**Keywords:** Shift Work, Arrhythmias, Heathcare, Holter