



Review Article

Copyright© René Aguilar

Use of Pulse Oximetry in Quantum Metabolic Analysis in Regenerative Medicine: A Narrative Review

René Aguilar*

¹Aguilar Clinical Laboratory and Blood Bank, Quetzaltenango, Guatemala

²Psidium Phytotherapy Center, Farmaya Phytopharmaceutical Products, Guatemala

*Corresponding author: René Aguilar, Aguilar Clinical Laboratory and Blood Bank, Quetzaltenango, Guatemala.

To Cite This Article: René Aguilar*. Use of Pulse Oximetry in Quantum Metabolic Analysis in Regenerative Medicine: A Narrative Review. *Am J Biomed Sci & Res.* 2025 28(6) *AJBSR.MS.ID.003736*, DOI: [10.34297/AJBSR.2025.28.003736](https://doi.org/10.34297/AJBSR.2025.28.003736)

Received: 📅 October 23, 2025; **Published:** 📅 October 25, 2025

Summary

The text presents a broad overview of the advances and innovative approaches in current medicine, integrating both conventional and alternative practices. Regenerative medicine stands out as a promising therapeutic option for treating degenerative diseases, injuries, and conditions previously considered incurable. Complementary therapies such as acupuncture, meditation, yoga and medicinal plants are valued for their effectiveness in relieving pain and improving emotional well-being.

Degenerative diseases, being chronic and progressive, affect the patient in a comprehensive way using proteins to stop the inflammatory process, generating therapeutic needs that address the physical, emotional and social aspects. In this context, the pulse oximeter is an essential tool in modern medicine to detect oxygen saturation and prevent respiratory complications and to be a non-invasive instrument for cationic quantification of proteins.

The text also addresses the use of herbal medicine as an alternative to NSAIDs, due to its anti-inflammatory properties without serious side effects. Components such as flavonoids and bromelain stand out.

Regarding mitochondrial damage in inflammatory processes that degrade proteins, it explains how SARS-CoV-2 affects key functions of the mitochondria, altering energy production, increasing oxidative stress and inducing systemic inflammation.

On the other hand, quantum biosensing and quantum biosensors by pulse oximetry are introduced, emerging technologies that apply principles of quantum mechanics to detect biological molecules, viruses or toxins with high precision. These sensors enable more sensitive, faster, and more effective medical diagnoses, although they still face technical challenges.

Overall, the text highlights how the integration of advanced technologies with complementary therapies can significantly improve the diagnosis, treatment and well-being of patients in the context of complex diseases.

Keywords: Regenerative medicine, Pulse oximeter, NSAIDs, Quantum analysis, Proteins in inflammatory process.

Abstract

The text presents a broad overview of advances and innovative approaches in modern medicine, integrating both conventional and alternative practices. Regenerative medicine stands out as a promising therapeutic option for treating degenerative diseases, injuries, and conditions previously considered incurable. Complementary therapies such as acupuncture, meditation, yoga, and medicinal plants are valued for their effectiveness in relieving pain and improving emotional well-being.

Degenerative diseases, being chronic and progressive, affect patients holistically, utilizing proteins to stop inflammatory processes and creating therapeutic needs that address physical, emotional, and social aspects. In this context, the pulse oximeter is an essential tool in modern medicine for detecting oxygen saturation and preventing respiratory complications, as well as serving as a non-invasive instrument for cationic protein quantification.

The text also discusses the use of herbal medicine as an alternative to NSAIDs, due to its anti-inflammatory properties without severe side effects. Components such as flavonoids and bromelain are highlighted.

Regarding mitochondrial damage in inflammatory processes that degrade proteins, it explains how SARS-CoV-2 affects key mitochondrial functions, altering energy production, increasing oxidative stress, and inducing systemic inflammation.

Furthermore, the text introduces quantum biotecnología and quantum biosensors through pulse oximetry-emerging technologies that apply principles of quantum mechanics to detect biological molecules, viruses, or toxins with high precision. These sensors enable more sensitive, rapid, and effective medical diagnostics, although they still face technical challenges.

Overall, the text emphasizes how the integration of advanced technologies with complementary therapies can significantly improve diagnosis, treatment, and patient well-being in the context of complex diseases.

Introduction

Nowadays, the search for diagnostic and analytical methods that are accurate, efficient and above all non-invasive has gained unprecedented relevance. In this context, quantum analysis emerges as an innovative and promising tool, capable of offering detailed information on the physical and energetic state of a person without generating any type of damage or discomfort, which if it appears can be confirmed by the appropriate diagnostic method (Clinical Laboratory, Diagnostic Imaging Center) unlike many traditional procedures that can be invasive or generate side effects. This technology relies on principles of quantum physics to interact with the body in subtle and safe ways. Its implementation represents a significant advance in the field of wellness and preventive medicine, as it allows potential imbalances to be detected before they manifest themselves clinically. This review aims to explore the fundamentals, applications, and advantages of non-invasive quantum analysis, highlighting its role as a modern and environmentally friendly alternative in the current panorama of integral health.

Regenerative Medicine

[7] details that regenerative medicine has emerged as a therapeutic alternative within the field of medical sciences, not only offering hope, but also tangible solutions for patients with degenerative diseases, organ transplants and traumas that previously seemed incurable. In this context, therapies such as acupuncture, meditation, yoga and the use of medicinal plants have emerged as promising options, these interventions have shown, according to various studies, positive results in reducing pain, improving emotional well-being and increasing the quality of life of patients. In addition, they offer a complementary approach to conventional medicine, considering both the physical and psychological aspects of the patient.

In recent decades, the therapy of tissue granules present in autologous Platelet-Rich Plasma (PRP) has aroused a lot of attention in the area of regenerative medicine, being applied to different systemic and localized pathologies. The tissue granules of autologous PRP provide various growth factors and proteins that can stimulate the process of cell regeneration, represents an important factor for its widespread clinical use, in different tissues where the blood supply is slow or limited and supports recovery, healing, biological activation of defense cells, stabilization in cell and tissue regeneration, having clinical use in almost all medical specialties [3].

Degenerative Diseases

These diseases constitute a group of chronic pathologies characterized by the progressive deterioration of the structure and

function of tissues, which has a significant impact on the quality of life of those who suffer from them, the chronic and multifaceted nature of these diseases not only affects physical well-being, but also emotional and social well-being. increasing isolation and misunderstanding by the environment, which has generated a growing need to explore therapeutic alternatives that address the management of chronic pain in a more comprehensive way [18].

Use of Pulse Oximeter for Disease Detection

[2] details that the pulse oximeter is a medical device that measures SpO₂ (peripheral oxygen saturation) in the blood in a non-invasive way, this means that it is not necessary to extract a blood sample, allows SpO₂ to be obtained quickly and accurately, as well as the frequency of pulsations per minute, These measurements are important for the identification of patients who may be at risk of hypoxia and who require medical attention, such as hospitalization or oxygen therapy, it is essential in anesthesiology, intensive care and surgery, it operates through two fundamental principles: spectrophotometry and photoplethysmography. It uses spectrophotometry to measure the percentage of oxyhemoglobin (HbO₂) saturation in the blood, while photoplethysmography is used to differentiate arterial blood from venous blood [5].

Alternative Medicine in Inflammatory Diseases

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) are widely used for their anti-inflammatory, analgesic, antipyretic, and antiplatelet effects, but their use can cause serious adverse effects such as ulcers or kidney failure. As an alternative, medicinal plant extracts stand out, used by 80% of the population in developing countries, according to the WHO. Natural components such as flavonoids, triterpenes, saponins, and triterpenoids possess anti-inflammatory properties by inhibiting prostaglandin synthesis.

A prominent example is bromelain, an enzyme in pineapple, with anti-inflammatory, anti-edematous, antithrombotic, fibrinolytic and immunomodulatory effects, without presenting significant side effects. Herbal medicine offers effective, accessible, and economical alternatives to conventional treatments, providing both scientific and cultural value [4].

Damage to the Mitochondria in Inflammatory Processes

[8] mention that Mitochondria regulate Cellular Metabolism, Immune Responses, and Apoptotic Pathways.

SARS-CoV-2 infection disrupts these functions by inducing

structural and molecular alterations in the Mitochondrial Membrane, altering the integrity of Mitochondrial DNA (mtDNA), and affecting ATP production. In patients with severe COVID-19, circulating Mitochondrial Proteins, such as Cytochromes and Ribosomal Subunits, are markedly elevated, indicating Systemic Mitochondrial Injury.

SARS-CoV-2 infects Alveolar Epithelial Cells, causing Mitochondrial Dysfunction and damage to the Calcium carrier [1].

Abnormalities in Mitochondrial Dynamics

Mitochondrial dynamics, including fusion, fission, biogenesis, and mitophagy, regulate the shape and function of mitochondria. SARS-CoV-2 infection alters this dynamic, affecting mitochondrial function by depolarizing the membrane and increasing oxidative stress levels, which contributes to inflammation, organ failure, and mortality in COVID-19, as well as long COVID fatigue. The virus increases the expression of proteins such as PINK1, Parkin, MFN2 and DNM1L. In addition, the viral protein ORF3a induces fission and cell death, while ORF9b promotes cell fusion and survival [8].

Mitochondrial Damage Induces Inflammation

SARS-CoV-2 induces Mitochondrial Dysfunction and Oxidative Stress. In severe cases, elevated levels of NADPH oxidase activity affect immunity and cause inflammation. The virus increases oxidative stress levels through inflammatory pathways, leading to cytokine storms.

The virus affects antioxidant responses through Hypoxia-Inducible Factor (HIF)-1 α . The initial infection causes Cell Death and Endothelial Damage, which triggers Inflammation that can lead to Organ Failure. Severe cases show activation of neutrophils and excess of pro-inflammatory cytokines that disrupt mitochondrial function [8].

Non-Invasive Quantum Analysis in Medicine

Quantum biosensing refers to the use of quantum phenomena or principles of quantum mechanics in biological sensing and sensing applications. It involves harnessing the unique properties of quantum systems to develop highly sensitive and precise techniques for detecting biological molecules, pathogens, or other biological entities. Quantum biosensing detects and tracks the movement of individual molecules or even individual atoms within biological samples, providing valuable insights into various biological processes. It allows us to achieve millimeter accuracy in the measurement of response data, achieved by the delicate detection of nuances in the dynamic movement of magnetic and electric fields [9].

State of the Art of Quantum Biosensing

Biosensors are among the most fortunate tools available in the biomedical and international healthcare fields today for diagnosing diseases, identifying multidrug-resistant organisms, identifying emerging epidemics, and recognizing very low concentrations of

poisons and microorganisms in drinking water or food. However, there are certain serious challenges that scientists and engineers working on these issues must overcome. For example, if biosensors are to increase the accuracy and effectiveness of medical diagnosis, they must be sensitive enough to detect even trace amounts of germs in blood or other biological samples [19].

Applications of Quantum Biosensors in Medical Diagnostics

Medical diagnostics has demonstrated considerable potential for quantum biosensors, which use the concepts of quantum mechanics. Quantum Biosensors are sophisticated sensing tools that use the laws of quantum mechanics to identify and examine biological components with extreme precision and sensitivity, including proteins, DNA, RNA, and tiny compounds. These materials are sensitive to changes in the local environment caused by biomolecular interactions because they show quantum confinement effects, size-dependent optical features, or remarkable electron conductivity. The quantum material changes in electrical conductivity, surface plasmon resonance, fluorescence intensity, and other electronic and optical characteristics following biomolecular interaction. The biological signal is transduced into a quantifiable output signal by this change in characteristics. Depending on the transduction mechanism used, various methods are used to detect and evaluate the quantifiable output signal from the Chemical Biosensor. These biosensors are very sensitive and precise detectors of biological molecules that make use of quantum phenomena such as superposition and entanglement [9].

Nobel Prize in Physics Quantum Analysis

According to [16] Chatgpt.com mentioned that through a Quantum Analysis deficiency of vitamins D, B12 that regulates the expression of the FOXP3 gene can be alerted that can cause diseases or autologous autoimmune control, this also helps to develop quantum computers, ultra-precise sensors and quantum cryptography [10].

Fundamental science confirms that the rules of quantum mechanics apply not only to tiny things, but also to larger systems that we can manipulate and measure [14].

Extracting quantitative information from the microstructure of living tissue using non-invasive imaging is an outstanding challenge to understanding disease mechanisms and enabling early diagnosis of early-stage pathologies [13].

Nobel Prize in Medicine

According to [17] Chatgpt.com mentioned about Vitamin D and the FOXP3 gene that:

- a. Active vitamin D (calcitriol) binds to its receptor (VDR, Vitamin D Receptor) inside T cells. The VDR-vitamin D complex directly activates the FOXP3 gene, which increases the amount and potency of Tregs, which suppress the excessive immune response [15]

Conclusions

After analyzing this review, it is concluded that non-invasive quantum analysis can be a tool that allows us to evaluate the nutritional proteinemic status of patients that allow us to respond better to inflammatory or infectious processes, currently the quantum diagnosis obtained by means of pulse oximetry in a preliminary study of 50 patients, details a frequency of 98.3% of frequency, according to direct question of pre-existing diseases confirmed with laboratory tests and diagnostic imaging method, the patients were of different ages regardless of the sex of those who have voluntarily participated, but stating that 89.8% have presented acid PH in said quantum procedure, the same procedure was performed in a volunteer population of the Kaiserslautern, In a city in Germany in which PH was presented in a different way due to solar disinfection [11], this method is an improvement of the SODIS system which is a method of water treatment that uses the sun's energy to purify it, combining Ultraviolet (UV) radiation and the increase in water temperature to eliminate pathogens, unlike in Guatemala, chemical processes are used to treat water, leaving it with an acidic pH due to the use of chlorine-based compounds in it, which has protein degradation that regulates anti-inflammatory processes [12].

SODIS emerges as a viable alternative, being an economical and accessible technique, its use is ideal in tropical and subtropical regions. [20].

The SODIS method avoids maintaining the acidic PH as it normally occurs in developing countries such as Guatemala, which has a different drinking water process, acidifying the pH of the water, which leads to the degradation of proteins and amino acids that prevent inflammatory processes [6], more future studies are needed to support and confirm the preliminary results described above, which, because it is a non-invasive method, does not put the health of any patient at risk and can support the multidisciplinary medical team to confirm or direct actions towards a better diagnosis.

Conflict of Interest

In this review and in the preliminary data available from a frequency study, there is no conflict of interest in the quantum analysis used or in the procedures carried out with any company or institution for the purchase or sale of the equipment used.

Acknowledgment

None.

References

- Aguilar R (2021) Sars-Cov-2 Covid-19: Narrative review. Journal of Biomedical and Applied Medical Sciences 9(5): 675-684.
- Aguilar R (2022) Fatigue symptom and oximetry sign in a patient with a positive Covid-19 antigen test for Sars-Cov-2. Jour Med Resh and Health Sci 5(8): 2165-2176.
- Aguilar R, Cáceres A (2020) Platelet-rich plasma as autologous therapy in regenerative medicine: Narrative review. Science Technology and Health 7(3): 442-460.
- Aliena NG (2023) ALTERNATIVES OF HERBAL MEDICINE IN ANTI-INFLAMMATORY THERAPY. Anesthlg.
- Bonilla AJA, Valdez JRC, Sánchez CH, Domínguez ÁHC (2025) Development of a pulse oximetry acquisition system. Revista Aristas 12(20): 186-190.
- CAMOTÁN C (2022) UNIVERSIDAD SAN CARLOS DE GUATEMALA FACULTY OF CHEMICAL SCIENCES AND PHARMACY.
- Criollo EJC (2025) Regenerative medicine as a therapeutic alternative for chronic diseases and serious injuries: Advances, challenges and clinical applications. Multidisciplinary Journal of Contemporary Research 3(2): 552-575.
- Cobar O, Cobar S (2025) Viral Mitochondriopathy in COVID-19.
- Das S, Mazumdar H, Khondakar KR, Mishra YK, Kaushik A, et al. (2024) Quantum biosensors: principles and applications in medical diagnostics. ECS Sensors Plus 3(2): 025001.
- Domínguez E, Ferre M, Moya Llamas MJ, Ortuño N, Prats D, et al. (2025) Removal of indicator micropollutants included in Directive (EU) 2024/3019 by nanofiltration and reverse osmosis. Water 17(9): 1269.
- Dufner L, Hofmann P, Dobslaw D, Kern F (2025) Degradation of bacteria for water purification in a TiO₂-coated photocatalytic reactor illuminated by solar light. Applied Water Science 15(5): 1-13.
- Dumetz AC, Chockla AM, Kaler EW, Lenhoff AM (2008) Effects of pH on protein-protein interactions and implications for protein phase behavior. Biochimica et Biophysica Acta (BBA)-Proteins and Proteomics 1784(4): 600-610.
- Capiglionni M, Zwick A, Jiménez P, Álvarez GA (2021) Noninvasive Quantitative Imaging of Selective Microstructure Sizes via Magnetic Resonance. Physical Review Applied 15(1): 014045.
- Fuoco D (2025) How To Predict the Winners of The Nobel Prize For 2025. Available at SSRN 5254426.
- Jalali SR (2025) Nobel Prize in Medicine and Physiology: 10 Proven Scenarios Demonstrating the Merit of the Hamzah Equation (ΩH^*) for Receiving the Nobel Prize in Physiology and Medicine. (If the Criteria are Applied Fairly, and Not Judged Merely on the Basis of the Hamzah Equation Being Non-Anglo-Saxon in Origin).
- OpenAI (2023) ChatGPT.com (November 30 version) [large language model].
- OpenAI (2023) ChatGPT.com (November 30 version) [large language model].
- Pérez WOM, Ivone TMR, Stephany VAD, Javier UFF, Gabriela BA, et al. (2025) Alternative Medicine for the Management of Chronic Pain in Degenerative Diseases. Studies and Perspectives Scientific and Academic Journal 5(1): 140-156.
- Wang YF, Niass (2024) MI Quantum biosensors: principles and applications in medical diagnostics.
- Mersha DA, Abera MK, Melekhoa A, Fruk L (2025) Solar disinfection of water assisted with photochemical additives: a sustainable approach. In Sustainable Development Research in Materials Engineering and Renewable Energy: Advances in Science and Technology: 103-125.