

## The triad of forensic science: nuclear medicine, legal medicine and quantum physics

A tríade da ciência forense: medicina nuclear, legal e física quântica

La tríada de ciencias forenses: medicina nuclear, medicina legal y física cuántica

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### Abstract

Nuclear Medicine is a diagnostic method that integrates radioactive substances such as Sodium Perchnetate (Technetium= $^{99m}\text{Tc}$ ) and Iodine-131. Nuclear Medicine, Forensic Medicine or molecules marked with the radioisotope Sodium Perchnetate, associated with drugs, contribute to Forensic Science. Therefore, as the energetic aspect influences the human organism, the present study aims to describe the interrelationships between Nuclear Medicine, Legal Medicine and Quantum Physics and their applications to Forensic Sciences. Thus, the literature review study with a systematic approach was conducted in June 2023, from the following databases: Virtual Health Library (VHL) and Publisher Medline (PubMed), obtaining 11 scientific articles. Therefore, it was found that the diagnosis of brain death and vegetative stage, based on imaging tests such as Cerebral Scintigraphy, contributes to legal parameters associated with organ donation for therapeutic purposes, which requires family authorization of the patient who died. Brain waves can be linked to fundamentals of quantum physics. Therefore, the energy aspect can influence therapies, disease detection and consequently the human body. However, the relevance of Nuclear Medicine in the diagnosis and treatment of diseases was verified, which is associated with Legal Medicine and Forensic Sciences.

**Keywords:** Nuclear medicine; Legal medicine; Forensic sciences; Radiology.

### Resumo

A Medicina Nuclear constitui um método de diagnóstico, que integra substâncias radioativas como o Pertecnato de Sódio (Tecnécio= $^{99m}\text{Tc}$ ) e o Iodo-131. A Medicina Nuclear, Medicina Legal ou moléculas marcadas com o radioisótopo Pertecnato de Sódio, associado a fármacos, contribuem para a Ciência Forense. Portanto, como o aspecto energético exerce influências no organismo humano, o presente estudo objetivou descrever as inter-relações entre a Medicina Nuclear, Medicina Legal e Física quântica e suas aplicações às Ciências Forenses. Assim, o estudo de revisão da literatura com abordagem sistemática foi efetuado em junho de 2023, a partir das seguintes bases de dados: Biblioteca Virtual em Saúde (BVS) e Publisher Medline (PubMed) e obteve-se 11 artigos científicos. Logo, verificou-se que o diagnóstico de morte cerebral e estágio vegetativo, baseado em exames de imagem como a Cintilografia Cerebral, contribui para parâmetros jurídicos associados à doação de órgãos para finalidade terapêutica, onde requer a autorização familiar do paciente que evoluiu para óbito. As ondas do cérebro podem associar-se a fundamentos da física quântica. Portanto, o aspecto energético pode influenciar terapias, detecção de enfermidades e consequentemente o organismo humano. Contudo, verificou-se a relevância da Medicina Nuclear no diagnóstico e terapia de enfermidades, que associa-se a Medicina Legal e Ciências Forenses.

**Palavras-chave:** Medicina nuclear; Medicina legal; Ciências forenses; Radiologia.

### Resumen

La Medicina Nuclear es un método de diagnóstico que integra sustancias radiactivas como el Pertecnato de Sodio (Tecnecio= $^{99m}\text{Tc}$ ) y el Yodo-131. La Medicina Nuclear, la Medicina Legal o las moléculas marcadas con el radioisótopo Pertecnato de Sodio, asociadas a drogas, contribuyen a la Ciencia Legal. Por lo tanto, como el aspecto energético influye en el organismo humano, el presente estudio tiene como objetivo describir las interrelaciones entre la Medicina Nuclear, la Medicina Legal y la Física Cuántica y sus aplicaciones a las Ciencias Forenses. Así, el estudio de revisión bibliográfica con abordaje sistemático fue realizado en junio 2023, a partir de las siguientes bases de datos: Biblioteca Virtual en Salud (BVS) y Publisher Medline (PubMed), obteniendo 11 artículos científicos. Por lo tanto, se constató que el diagnóstico de muerte encefálica y etapa vegetativa, con base en pruebas de imagen como la Gammagrafía Cerebral, contribuye a los parámetros legales asociados a la donación de órganos con fines terapéuticos, que requiere autorización familiar del paciente fallecido. Las ondas cerebrales se pueden vincular a los fundamentos de la física cuántica. Por lo tanto, el aspecto energético puede influir en las terapias, la detección de enfermedades y, en consecuencia, en el cuerpo humano. Sin embargo, se constató la relevancia de la Medicina Nuclear en el diagnóstico y tratamiento de enfermedades, la cual está asociada a la Medicina Legal y Ciencias Forenses.

**Palabras clave:** Medicina nuclear; Medicina legal; Ciencias forenses; Radiología.

## 1. Introduction

Nuclear Medicine is a radiodiagnosis methodology that uses radioactive compounds, aiming at the detection and therapy of diseases, as it includes the use of signals marked with the radioisotope Sodium Pertechnetate (Technetium= $^{99m}\text{Tc}$ ) and Iodine $^{131}\text{I}$ . However, the applicability of radiation also occurs through Forensic Radiology, as it aims to detect projectiles derived from firearms in patients and is associated with medical practices related to laws, referred to as Legal Medicine. Marie Curie and her daughter Irène Joliot-Curie were the pioneers in working with mobile X-rays in the 1st World War (Lima et al., 2021; Santos et al., 2022).

The chronology of Nuclear Medicine dates back only two years, after the discovery of x-rays in 1895 by means of Roentgen. However, the identification of the natural radioactive elements referred to as Radium and Polonium, occurred through the couple Pierre and Marie Curie (Daniels & Ross, 2023). Thus, Marie Curie represents the first woman who received the Nobel Prize in Physics and Chemistry, during 1903 and 1911 respectively, substantiating aspects of the treatment of breast neoplasms. Therefore, in the near future, Nuclear Medicine will emerge, as a method that uses small amounts of radioactive elements, associated with drugs that have tropism with specific organs (Pedrozo et al., 2020).

The radiation doses used for the diagnostic process in Nuclear Medicine, in reduced concentrations, are safe and include the absence of side effects or toxicity. Therefore, Sodium Pertechnetate ( $^{99m}\text{Tc}$ ) is a radioactive compound extracted (Eluate) from a source of molybdenum 99, which emits gamma radiation, whose biodistribution in the human organism occurs in specific exams, as it has a half-life corresponding to 360 minutes. Sodium pertechnetate is used in imaging tests, such as scintigraphy and positron emission computed tomography (Lima et al., 2021).

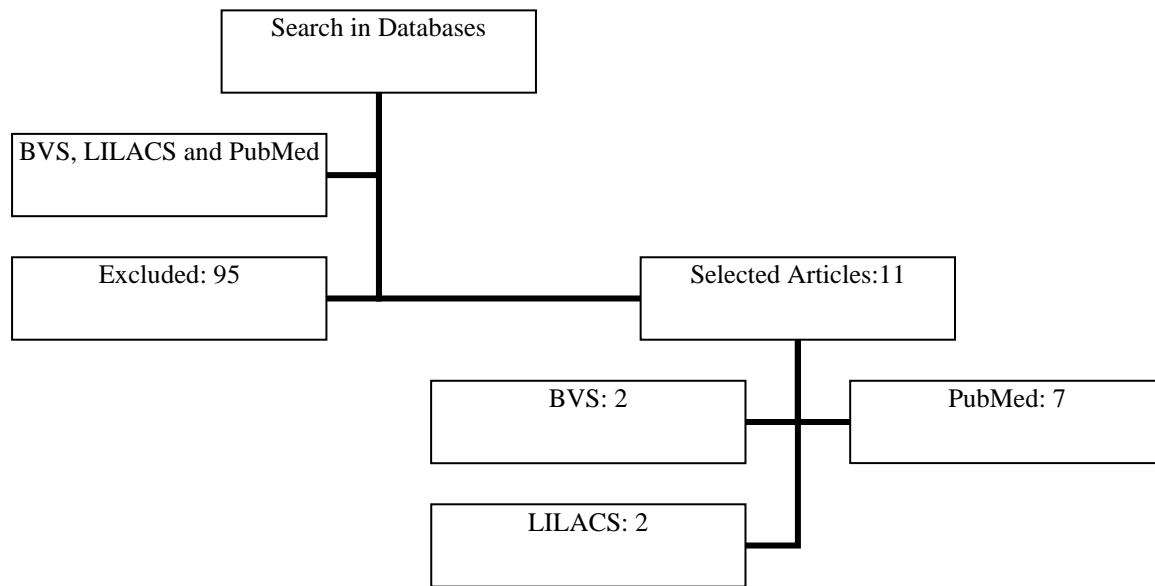
Radioactive compounds propagate energy, therefore, the energetic aspect influences the human organism to give a response through the image (Ramos et al., 2020). Thus, during the 1900's, Max Planck addresses that quanta forward energy. In 1944, Max Planck explained the existence of energy in the universe (Junior, 2021). Thus, this study aims to describe the interrelationships between Nuclear Medicine, Legal Medicine and Quantum Physics and their applications to Forensic Sciences. It is impossible to talk about Nuclear Medicine without sharing some elementary concepts that guide this subject.

## 2. Methodology

Upon questioning the association between Nuclear Medicine, Legal Medicine and Quantum Physics and their applications to Forensic Sciences, a literature review study with a systematic approach was developed in June 2023, based on platforms such as the Virtual Health Library (VHL), Publisher Medline (PubMed) and Latin American Literature (LILACS). According to Vieira and Hossne (2021), the systematic scientific article enables the search, eligibility, analysis or brief description of updates on a given theme, through inclusion or exclusion parameters. The descriptors that promoted this article correspond to Nuclear Medicine, Physics and Forensic Medicine. This study presents the qualitative data analysis technique.

The established exclusion criteria are theses, literature review studies and scientific opinion papers. The delimited inclusion parameters were scientific works in Portuguese, English and Spanish, published between 2010 and 2023, therefore, the selection of 11 articles was carried out for the present study. The article screening process was based on the analysis of titles, abstracts and the full text of research, as shown in Figure 1 (Ercole et al., 2014).

**Figure 1** - Shows the result of screening scientific articles.



Source: Own authorship (2023).

### 3. Results and Discussion

The present work covered 11 studies with different methods, whose main results are presented in Table 1.

**Table 1** - Presents the selected articles, based on inclusion and exclusion criteria.

Author	Title	Main results
Flach et al., (2014)	Times have changed! Forensic Radiology — A New Challenge for Forensic Radiology and Pathology.	The forensic area includes pathological analyzes of patients who died, toxicology and molecular biology.
Santos et al., (2021)	Imaging protocols for the autopsy service in times of a pandemic emergency minimize the contagion of government agents specialized in SARS-CoV-2.	Forensic radiology makes contributions to forensic medicine in documentation and determination of legal claims.
Silva et al., (2022)	Forensic Radiological Sciences.	Radiological sciences are classified into forensic radiology and forensic radiology. Legal radiology combines radiology in the medical and dental field. Forensic radiology is associated with the legal field.
Zerbini & Saldiva (2014)	The Historical Evolution of the Tools Available for Initial Chronotanagnosis.	Forensic Medicine adds the execution of medicinal and physiological fundamentals in the formation and fulfillment of specific laws.
Panda et al., (2015)	Virtopsia Computed Tomography in Trauma: Normal Postmortem Changes and Pathological Spectrum of Findings.	Virtopsy is a method that adds to the traditional autopsy and is performed using computed tomography or magnetic resonance imaging.

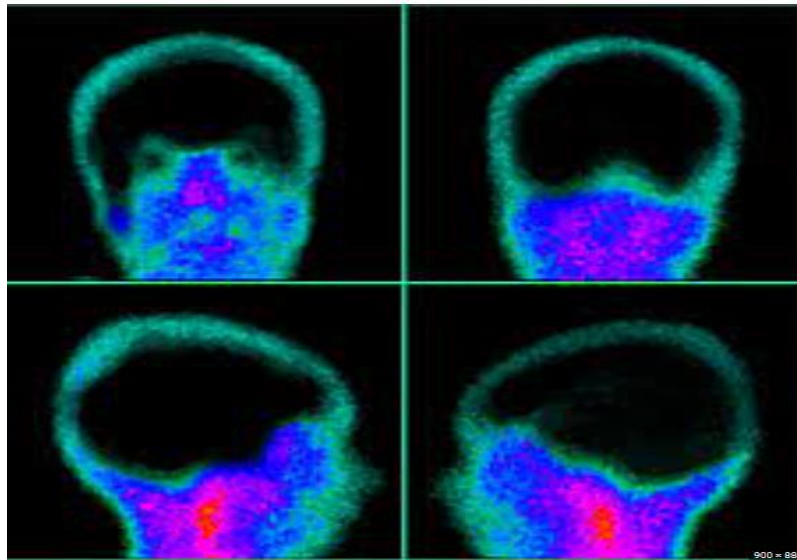
Source: Own authorship (2023).

The process of investigation and evaluation of internal and external carotid dissection, stenosis, ischemia, thrombosis, which can trigger cognitive impairment, or other pathologies associated with low encephalic hematopoietic flow, preventing nutrition of the basilar and communicating artery, middle cerebral artery and the important Polygon of Willis, in this way, will produce signs and symptoms, the object of the study will always attend the clinic that is sovereign occurs through the Nuclear Medicine exam referred to as Cerebral Scintigraphy or SPECT (Single Photon Emission Computed Tomography) (Pataro, 1976). Therefore, to be requested, expertise in the execution of the scintigraphic method is extremely important, since the administration of the compound Colloidal Tin (ECD) plus the radioisotope Sodium Pertechnetate, ensures the time lapse for the need to improve the protocol (Thali et al., 2010).

The radioisotope Sodium Pertechnetate is a molecular and metabolic (analysis) marker, it helps in the diagnosis of pathologies associated with nervous system impairment, such as Alzheimer's, Parkinson's, brain death or vegetative state. Cerebral Scintigraphy it is also performed in lucid, oriented patients, therefore, it requires a preparation room for the same,

which aims to reduce the organic metabolic activity, for the execution of the scintigraphic method, as it examines aspects of brain functionality, as well as blood irrigation in regions of the brain, as shown in Figure 2 (Santos et al., 2021).

**Figure 2** - Brain Death detected in Nuclear Medicine Gold Standard in Accuracy, using the Radiopharmaceutical ECD (Colloidal Tin) following the legal order for the release of organ donation.



Source: Campilongo (2017).

Cerebral Scintigraphy or skull SPECT is also requested to investigate Normal Pressure Hydrocephalus, whose materials used must be sterile during the intrathecal administration of the radiopharmaceutical. However, the diagnosis of brain death and vegetative stage (described post-mortem) established by the physician through imaging exams, contributes to legal parameters associated with the donation of organs for therapeutic purposes, which is carried out through the authorization of the patient's family. Evolved to death (Flach et al., 2014).

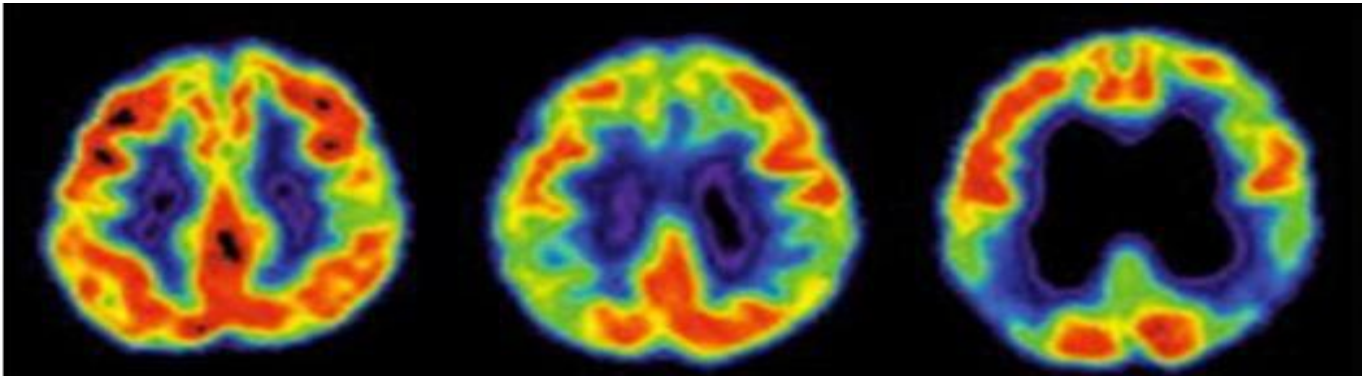
Exams with Iodine 131 have peculiar characteristics, as the marked cells are those that have an affinity for Iodine, in the cervical region or throughout the body. Iodine is administered orally, because carcinoma cells in the cervical region are avid for this radioisotope affinity. Iodine can be administered on an outpatient basis (with controlled doses) to correct thyroid dysfunction and also in high doses for post-surgical patients, to burn residual cells from thyroid neoplasms. These same patients were hospitalized for 3 to 5 days, while their absorbed dose of Iodotherapy was low enough to be shared with family members and the general public. All radioprotection will be verified with the Physicist, Technologist in Radiology Specialist in Nuclear Medicine and Nuclear Physician (France, 2011).

According to Panda et al. (2015), patients with histories of metastases without evolution of pain treatment, are submitted (when they have profile) to doses of Samarium 153 for pain relief for approximately 2 months (Exclusive Therapy of Nuclear Medicine). In Nuclear Medicine, technical protocols are as important as the manipulation of radionuclides, because 80% of Nuclear Medicine exams use Sodium Pertechnetate linked to drugs and their tropisms. The most common are:

1 - MDP (Potassium Methylene Diphosphonate + Tc 99) - Bone scintigraphy for suspected diagnosis of metastases, Paget's disease, Stress fracture, Osteosarcoma, Osteomyelitis and Anomalous Calcifications (Campilongo, 2017).

2 - ECD (Colloidal Tin +Tc 99) - Cerebral Scintigraphy or SPECT for suspected diagnosis of Alzheimer's, Parkinson's, Brain Death, Dementia and Hydrocephalus shown in Figure 3. In the case of a normal conventional Cranial Computed Tomography, brain SPECT is performed with administration of the radiotracer in a preferably neutral zone (the feet region is more indicated), as it improves the accuracy in the visualization of the carotid arteries (Carvalho et al., 1963).

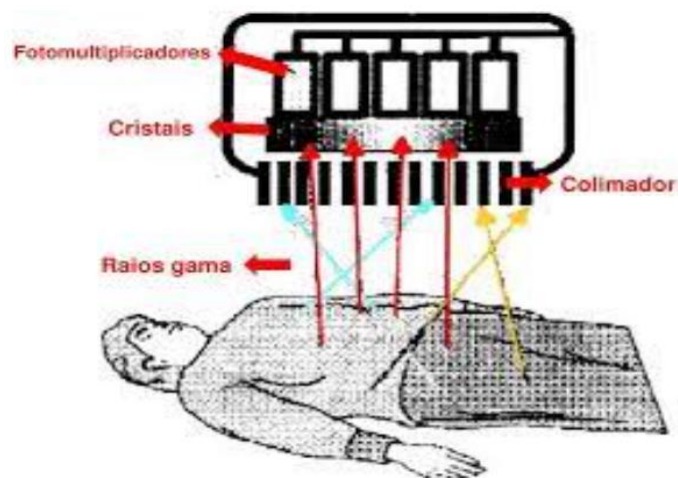
**Figure 3** - Presents the Normal and Alzheimer's brain.



Source: Panda et al. (2015).

3 - SAH (Human Albumin Serum+Tc99) - Lymphoscintigraphy and Sentinel Lymph Node research requires dynamic administration because it is a subcutaneous injection (in a breast nodule or between the toes for total body tracking), the idea is find the lymph node, where 1st the patient is immediately sent to the surgical center with the respective image result to guide the surgeon, all waiting for the Technologist in Radiology Specialist in Nuclear Medicine with the Poor Gama equipment, as shown in Figure 4 (Campilongo, 2017).

**Figure 4** - Quantum Entanglement Detected by Nuclear Medicine, Gamma Chamber which is made of Sodium Iodide Crystal Activated with Thallium Capitating Photons (Packets of Light emitted by electrons when moving from one layer to another).



Source: France (2011).

4 - In the operating room, the surgeon removes the piece (nodule) professionally confirms radioactivity in it and finishes the work (Grabherr et al., 2014).

The article made an exclusive cut on this specialty, considering it as an area that includes Forensic Sciences, sharing the horizontal and vertical advancement of new technologies, influencing new studies and methods, in a perspective that includes the triad of Medical, Nuclear, Legal and Quantum (Widder, 2014).

Although there is a stir between the vegetative stage and coma, both share the legal system, requiring all arsenal of information to close the diagnosis. Nuclear Medicine, being a method of Molecular Imaging, describes the last two reports with great propriety, always using the 1st of the clinic that is sovereign (Zerbini & Saldiva, 2014).

1 - Vegetative stage the person is awake, but is not conscious, being prevented from understanding, speaking and

performing voluntary movements. She can yawn, make small sounds and breathe without the help of devices (Panda et al., 2015).

2 - Eat, the person does not wake up, does not move the eyes and does not perform involuntary movements (Zerbini & Saldiva, 2014).

In Brazil, article 1,775 of the Civil Code states: “The spouse or partner, not legally or de facto separated, is, by law, guardian of the other, when prohibited. § 1 - In the absence of a spouse or partner, the legitimate guardian is the father or mother, in the absence of these, the descendant who proves to be the most capable. § 2 - Among the descendants, the closest precede the most remote. § 3 - In the absence of the persons mentioned in this article, it is up to the judge to choose the curator” (Brasil, 2002).

The LOAS (Organic Law of Social Assistance), complies with the precepts of the WHO (World Health Organization), which says: “Life comes first” is the duty of the State (Government) to guarantee when the citizen cannot safeguard. § 2 - “For the purpose of granting the benefit of continued provision, a person with a disability is considered to be one who has a long-term physical, mental, intellectual or sensory impairment, which, in interaction with one or more barriers, may obstruct their full and effective participation in society, on an equal basis with others (Brasil, 1993).”

In this way, the State will support, for assistance or retirement, the citizen with (Brasil, 1993):

1 - Neoplasm (Metastases) - Examination = Gold Standard Total Body Bone Scintigraphy.

2 - PAGET's Disease - Exam = Gold Standard Total Body Bone Scintigraphy.

3 - Contamination with Radiation (Future Damage) = Cesium 137 somatic effect on cell DNA.

4 - Progressive degenerative disease, deforming or not - Osteoarthritis or Fibromyalgia = Total Body Bone Scintigraphy.

5 - Progressive Glandular Disease of Hormonal Disorder Disabling Behavioral Commitment (Hyperthyroidism without drug response).

If we are primarily atomic structures, first of all, our atoms carry some subatomic information. We are energies and that way, we can attract or repel. This accounts for our empathies or antipathies. In the crowd, eyes are drawn to those of “strangers”. People come and go, leaving a little of them and taking a little of us (Silva et al., 2022).

As the great 90-year-old Sailor Gilvandro Adriano dos Santos says: “Electromagnet with corpuscular behavior, the movement of atoms is intrinsically linked to the level of vibration in which it is found, therefore, the power of kinetic energy will indicate the field that will be harmonic” (Silva et al., 2022).

The photons produced and the vibrational pattern, indicate the Quantum world in which its brightness is found (its inner Sun). Position of the object, the atom never stops vibrating. This drive towards understanding the micro and macro vision of this fantastic gear that makes the universe work (Campilongo, 2017).

The great law of attraction corresponds to the principle of everything and leads us to infinite thinking. Our Cartesian limitation distances us from Quantum realities in the midst of approximately 14 Billion Galaxies. On the space-time compass, where are we really? Help me find us. Obtain existential affinities. Thinking of someone and that one showing up. Perfumes, sounds and images that bring back memories. We are pixel with energetic voxel. Algorithms archived in our large database (brain) that, when starting through the particles that move the recollection (return in time and space), are timeless (Iamundo, 2017).

In this article we will emphasize the isotopes that favor our study in question. We will dialogue with an excerpt from the research on the understanding of radiation in the human body, for the purpose of elucidation and accuracy in the studied diagnosis. The production of molecular images made after transient contamination will be able to perform physiological, metabolic and functional images, favoring an immediate diagnosis of the region (Campilongo, 2017).

The article will prioritize the use of the method for the legal forum and how it is possible for this specialty to serve a court efficiently. The studies of algorithms and random codes led us to a better understanding of the atomic structure. Quantum mechanics helped build a crystal of Sodium Iodide activated with Thallium where PMTs reside (Photo Multipliers inside Gamma Camera detectors), capable of increasing by 1,000,000 times the amount of photons emitted by the patient after injecting the radioactive material. The speed of light 299,792,458 is a certainty in the field of physics, regardless of the speed of the moving thing or object carrying the light. "The observer's gaze is different from the observer's point of view." This is a fact, that is, we can be in the same vehicle, in the same direction and have different points of view (Panda et al., 2015).

The creative entity of the human mind is capable of presenting various realities from the same scenario. We were created to accept everything that is measurable, but for everything that we have no explanation is divine or supernatural. The article adds to so many other concerns generated in our minds (Campilongo, 2017).

### **Case study 1:**

For the diagnosis of Alzheimer's disease,

Legal guidance: The patient is now assisted by a responsible person (guardianship). Initiated documentation, as well as proof of life. In relation to brain death, the brain death protocol: Legal guidance covers three exams that can attest to brain death to release all documentation for organ donation. Sentinel lymph node detection occurs through radiopharmaceutical marking in the breast or lymphoscintigraphy (total body). The drug used is SAH (Human Serum Albumin). The patient is taken to the operating room. The procedure is monitored by a Radiology professional, equipped with equipment called the Gama Probe, to identify the area with the highest radiation (Iamundo, 2017).

Case 1:

Alzheimer's Diagnosis

Legal advice: The patient is now assisted by a guardian. Initiated documentation, as well as proof of life of the guardian's responsibility (Campilongo, 2017).

### **Case 2:**

Diagnosis: Brain death

Brain death protocol: administer the radiopharmaceutical ECD (colloidal tin) into a preferably neutral venous access such as the foot or hand, if possible, the idea is to also try to visualize a carotid stenosis, dissection or aneurysm (Carvalho et al., 1963).

Legal guidance: In order to start documenting organ donation, the court requires at least three tests to prove brain death and Nuclear Medicine is able to confirm the diagnosis. The multidisciplinary team is composed of Biomedical Doctors, Technologists, Pharmacists, Physicists who will guide the investigative process. Forensic Radiology responds to the law, that is, all Science when used in a court (Resolving a criminal matter or to clarify doubts whether it is a criminal complaint or to acquit an alleged accused, whether it is an individual who confessed after torture, it is requested, the corpus delicti exam). Art. 158 of the CPP deals with the subject, and the understanding of Forensic Radiology discusses the use in a court, the Method is Legal. Forensic Dentistry becomes Forensic Dentistry. Forensic Medicine becomes Forensic Medicine, as it legislates on population data (in obstetrics, giving birth certificates and death certificates) and investigates the living or the dead to obtain information (Widder, 2014).

In Forensic Radiology, legal Radiology was born, recognized by the Technologist and researcher Wendell Luz. Diagnosis closed, the patient now has someone responsible for his/her guardianship, since the patient will no longer be responsible for his/her mental faculties. Legal documentation begins, as well as proof of life (Carvalho et al., 1963).

When Forensic/Legal Radiology manages, through its legal methods, to contribute to solving the legal problem, a victim of a firearm (to locate the projectile), a victim of aggression where a fracture or hematoma occurs, to X-ray corpses, people, identifying the originality of works of art, using specific X-ray equipment (Flach et al., 2014).

Radiology shows its importance and demands more and more study and qualification from professionals, hours to work at the origin of its use (Radiodiagnosis), hours in ports, airports and prisons. In teaching, research, Radiology has shown, at the time of COVID-19, how much its method determines expected results that doctors need to guide the prognosis of patients (Iamundo, 2017).

### **Case 3:**

Diagnosis: Sentinel Lymph Node

Lymph node marking using the radiopharmaceutical human serum albumin (SAH) and tumor region (Silva et al., 2022).

Protocol: Patient after performing the injection of the radioisotope in the epidermis of the breast or armpit of the patient, then the image exam will be performed that will provide the exact location of the marked lymph node. A special ink marking will be made on the patient's dermis and when processing the image, the Radiology Technologist will deliver it to the patient (Flach et al., 2014).

At the end of the exam and in possession of the image released by the Technologist in Radiology, specialist in Nuclear Medicine, the patient must immediately go to the surgical center due to the risk of canceling the surgery. If the patient changes his route and does not go straight to the team, the team waiting for him at the hospital (Widder, 2014).

In the hospital, the surgery will only take place if the radiology technologist, specialist in Nuclear Medicine, is present with the portable equipment called the Poor Range. The function of this equipment (radiation capture health) is to guide the surgeon in removing the lymph node (surgical cut) without error, this equipment handling is done by the Radiology professional (Silva et al., 2022).

Sodium pertechnetate, also known as metastable technetium-99 (TC99m), it is important to point out that the approach made with the clipping on this radioisotope will not prevent others from being mentioned throughout this research. The production of molecular images made after transitory contaminations, can diagnose in physiological, metabolic and functional ways. We will present images that justify the use of the method for the legal forum, such as forensic sciences and Nuclear Medicine will demonstrate its efficiency. The gamma camera, gamma probe, hybrid gamma camera, radiosensitivity probe, are technological advances that have led nuclear medicine to this post-modern universe. The Gamma camera is a nuclear medicine equipment with two detectors, which performs bone scintigraphy, which will prove metastasis and verify Paget's disease (Campilongo, 2017). The study of algorithms and random codes led us to a better understanding of the atomic structure, quantum physics in equivalence (Grabherr et al., 2014).

Still talking about nuclear medicine, we have to admit defined concepts, methods and protocols that helped professionals in this specialty, but with a bias of affinity with the theme (Campilongo, 2017).

Regarding the biodistribution of the radionuclide, only bone scintigraphy exams with the radiopharmaceuticals MDP methylene diphosphonate potassium, whole body research with Iodine 131, and lymphoscintigraphy with the radiopharmaceutical human serum albumin (SAH), performing crucial whole body researches taking into account the Gallium 67, able to focus on the infectious disease, imaging the region of the bacterial site of the problem (Flach et al., 2014).

Like subatomic particles, we leave in the air and absorb from the other what we can exhale. This responds to signals that somehow once shared particles decoded by our living brain (Widder, 2014).

Returning to the atomic origin, we are made of atoms of Carbon, Iron, Potassium, Manganese, and the famous, among



others, the special Hydrogen of trillions that inhabited our body, each one responsible for millions of electrons moving or being removed from orbit. By forces beyond their will, (the phantom entities known by Physicists, as Neutrinos, where they come from and where they go is what everyone wants to know) even so they emit more and more photons. This responds to the fact that each being has its own light and therefore, brightness can attract or disturb. The universe is split half and half, time of light and dark (Sun and Moon). If that deal wasn't fair, the black hole claims its reason for swallowing us or the Sun with a huge burst of Radiation (Iamundo, 2017).

Nuclear medicine beyond the mechanistic, dynamic and real activity, showing that this universe exists and the isotope helps us to map the cells of the body like a GPS. There is this subatomic communication, that is undeniable. We can move in the same direction, in the same vehicle, in the same space of time and have different points of view due to the angle of our observation, therefore, the obvious ceases to exist, the space for relativism is placed. Still on energy packages, it is possible, in this theory, for subatomic communication to occur that facilitates the beginning of people who have existential affinities (França, 2011).

Bone examination, right after intravenous administration, the patient is advised to return 3 to 4 days later to take the images, during this waiting period it will be important for the patient to ingest 6 to 8 glasses of liquid, emptying the bladder whenever possible will (Grabherr et al., 2014).

This scan of the bone framework seeks to map mostly cancer patients with metastases, fractures or Paget's disease (Zerbini & Saldiva, 2014).

#### 4. Conclusion

Therefore, the relevance of Nuclear Medicine in the diagnosis and treatment of diseases was verified, which is associated with Legal Medicine and Forensic Sciences. The energy aspect can influence therapies, disease detection and consequently the human body. However, there is a need to develop more studies that describe how Nuclear Medicine, Legal Medicine and Quantum Physics influence the human body.

#### References

- Brazil (1993). Law No. 8742, of December 7, 1993. [https://www.planalto.gov.br/ccivil\\_03/LEIS/L8742.htm](https://www.planalto.gov.br/ccivil_03/LEIS/L8742.htm).
- Brazil (2002). Law No. 10,406, of January 10, 2002. [https://www.planalto.gov.br/ccivil\\_03/LEIS/2002/L10406compilada.htm](https://www.planalto.gov.br/ccivil_03/LEIS/2002/L10406compilada.htm).
- Campilongo, C. F. (2017). *Politics, legal system and judicial decision*. Max Limonad.
- Carvalho, H. V., Bruno, A. M. L., & Segre, M. (1963). *Legal medicine lessons*. Secretaria da Segurança Pública.
- Daniels, G. H., & Ross, D. S. (2023). Radioactive Iodine: A Living History. *Thyroid*, 33(6), 666-673.
- Flach, P. M., Thali, M. J., & Germerott, T. (2014). Times have changed! Forensic radiology- a new challenge for radiology and forensic pathology. *American Journal of Roentgenology*, 202(4) 325-334.
- France, G. V. D. (2011). *Legal Medicine*. Grupo Gen-Guanabara Koogan.
- Grabherr, S., Grimm, J., Dominguez, A., Vanhaebost, J., & Mangin, P. (2014). Advances in post-mortem CT angiography. *The British Journal of Radiology*, 87 (1036),1-15.
- Iamundo, E. (2017). *Hermeneutics and legal hermeneutics*. Saraiva Educação SA.
- Junior, O.F. (2021). The centennial debate on the interpretation and foundations of Quantum Physics. *Brazilian Journal of Science and Mathematics Teaching*, 4(3), 1047-1066.
- Lima, F. L. O., de Jesus Oliveira, K. J., Max, D. de A. S., Chemas, R. C., Oliveira, E. de A. N., Mamede, H., da Silva, A. L., das Mercês, D. M., Amaral, L. M. S., & dos Santos, A. S. F. (2021). Importance of gamma radiation using sodium pertechnetate (TC 99m) and iodine 131 as a suggestion in the treatment of COVID-19. *Research, Society and Development*, 10(1), 1-12.
- Panda A., Kumar A., Gamanagatti S., & Mishra B. (2015). Virtopsy computed tomography in trauma: normal postmortem changes and pathologic spectrum of findings. *Current Problems in Diagnostic Radiology*, 44(5), 391-406.

- Pedrozo, M., Giménez, G., Rojas, T., Grossling, B., Núñez, J., & Galván, P. (2020). Determination of the functional characteristics of thyroid nodules using nuclear medicine imaging in patients who attended the Instituto de Investigaciones en Ciencias de la Salud - UNA, in the period 2016-2019. *Rev. Public Health Parag*, 10(11), 59-65.
- Ramos-Bossini, A. L., Santiago, F. R., Cabrera, B. M., Zúñiga, D. L., & Sánchez, A. A. (2023). Diagnóstico por imagem das fraturas vertebrais de baixa energia. *Radiologia*, 65(3), 239-250.
- Santos, A. S. F., Dias, R. S., & da Luz Silva, W. (2021). Imaging protocols for the autopsy service in a time of pandemic emergency minimizing the contagion of SARS-CoV-2 expert government agents. *Research, Society and Development*, 10(6), 1-13.
- Santos, A. S. F., Dias, R. S., & Silva, W. L. (2022). The Birth of Legal Radiological Sciences in Brazil. *Research, Society and Development*, 11(2),1-13.
- Silva, W., Dias, R.S., & dos Santos, A. S. F. (2022). Forensic Radiological Sciences. *Scientific Magazine Health and Technology*, 2(10), 1-14.
- Thali, M. J., Viner, M. D., & Brogdon, B. G. (Eds.). (2010). *Brogdon's Forensic Radiology*. CRC Press.
- Vieira, S., & Hossne, W. S. (2021). *Scientific methodology for the health area*. Guanabara Koogan.
- Widder, J. (2014). The origins of radiotherapy: Discovery of biological effects of X-rays by Freund in 1897, Kienböck's crucial experiments in 1900, and still it is the dose. *Radiotherapy and Oncology*, 112(1), 150-152.
- Zerbini, T., & Saldiva, P. H. N. (2014). The Historical Evolution of the Tools Available for Initial Chronothagnosis. *Brazilian Journal of Forensic Sciences*, 3(2), 165-185.