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Legal Controls on The Use of Ionizing Radiation Technology in The Health Sector and Human Security Requirements

Dr. Bererma Sabrina
Faculty of Law and Political Science
Mohamed Lamine Debaghine University, Setif 2 (Algeria)
Email: s.bererma@univ-setif2.dz

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Abstract:
Radiation materials and sources used for medical purposes have caused harm to health professionals due to frequent exposure to ionizing radiation. Faced with these threats, it was necessary for the Algerian legislator to ensure prevention and security for this category of workers against the dangers of exposure to these radiations, as a right, through the establishment of laws and regulations that guarantee this.
Therefore, through this research paper, we attempted to assess the effectiveness of these legal texts in providing the greatest possible level of prevention and health security for health professionals against the dangers of exposure to ionizing radiation.
However, the Algerian legislator encountered difficulty in dealing with these risks, reflected in the multiplicity of legal texts on the one hand; the lack of a clear definition of the health professionals concerned by this protection on the other hand; and the difficulty in defining the concept of occupational diseases on the third hand, in addition to the lack of practical compliance with legal provisions.
Keywords: Health professionals, technology, ionizing radiation, radioactive materials, occupational risks.

Introduction

Radiation is used in many fields, most notably the medical field, which has witnessed significant progress as a result, as radiation has been used in detecting many diseases such as cancer and thyroid disorders, in addition to its use in sterilizing surgical materials. This is confirmed by the expansion in the use of ionizing radiation over the last two decades.
However, as technology develops, workplace accidents increase and new occupational diseases emerge that were previously unknown. This also applies to radiation sources for medical purposes, which have caused radiological damage to workers in this field due to frequent exposure.
The seriousness of these radiations is confirmed by a study conducted by the Curie Institute in France, which followed 250 patients over 25 years and found that 65% of incidents in the medical field were caused by radiotherapy. The most affected were doctors, nurses, maintenance workers, and sometimes patients. The most exposed professionals were those tasked with replacing or loading radiotherapy sources.[1]

Since the effects of radiation activity are dual (benefit/risk), experts and legislators have found it difficult to deal with them, especially given the diversity of these damages between random[2] and deterministic[3] effects; moreover, they may extend over time and even be transmitted across generations.

Faced with these threats, it has become necessary to ensure prevention and safety for health professionals against the dangers of exposure to ionizing radiation through the establishment of legal rules capable of ensuring the highest level of protection.

Thus, the objective of this study is to present a legal analysis of the sources of risks of exposure to ionizing radiation faced by health professionals and the means of preventing them.

To achieve this, we sought through this research paper to examine the legal framework governing this protection, as well as the various measures stipulated to ensure administrative protection for health professionals against the dangers of exposure to ionizing radiation, as a right.

All of the above leads to the following problem:

To what extent is Algerian legislation effective in ensuring the right of health professionals to prevention and security against the risks of ionizing radiation technology?

To address this problem, the study is divided into two axes:

- Chapter One: The legal framework of the right of health professionals to prevention and security against the risks of ionizing radiation technology.
- Chapter Two: The administrative protection of the right of health professionals to prevention and security against the risks of ionizing radiation technology.

Chapter One:
The legal framework of the right of health professionals to prevention and security against the risks of ionizing radiation technology

The study of the legal framework includes examining the legal concept of ionizing radiation technology and the legal nature of its risks, first, and the legal recognition of the right of health professionals to protection from these risks, second.

First: The legal concept of ionizing radiation technology and the legal nature of its risks

This element addresses the definition of "ionizing radiation" and related terms (A), and the legal nature of its risks (B).

A- Definition of "ionizing radiation" and related terms:

1- Definition of "ionizing radiation":

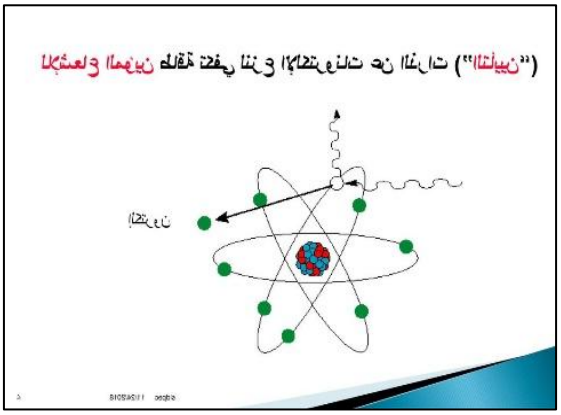
The term "radiation" includes two types: ionizing and non-ionizing radiation.

The Algerian legislator defined ionizing radiation in Article 4 of Law No. 19-05 relating to nuclear activities as:

"Ionizing radiation: the transfer of energy in the form of particles or electromagnetic waves capable of producing ions in matter, directly or indirectly."[4]

It was also defined in Article 2 of Presidential Decree No. 05-118 relating to food safety as: "Ionizing radiation is any electromagnetic or particulate radiation that may cause ionization of the exposed matter directly or indirectly."[5]

To clarify these definitions, the official page of the Directorate of Trade of Biskra explains that ionizing radiation consists of electromagnetic or particulate radiation with energy exceeding 10 electronvolts,[6] sufficient to remove electrons from atoms and molecules and convert them into ions. Hence the name "ionizing radiation." This means it can alter the natural state of atoms (a physical change), transforming them into electrically charged atoms and disrupting the balance between protons and neutrons, leading to the emission of alpha, beta, and gamma radiation. This disrupts biological and chemical processes due to radiation penetration into living organisms.[7]



These atoms may decay naturally or artificially and can be transmitted either as electromagnetic waves (gamma rays, X-rays) or as particles (neutrons, beta, or alpha)[8].look at picture 02

Image 1: Ionic interaction

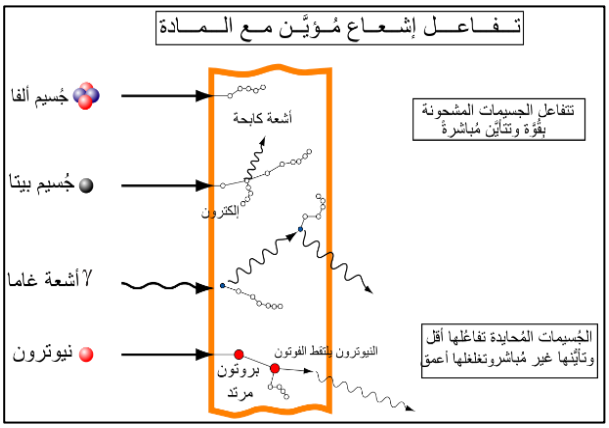


Image. 2: Interaction of ionizing radiation with matter

If the radiation energy is less than 10 electronvolts, it is considered non-ionizing radiation, such as infrared, ultraviolet, and low-frequency electromagnetic signals like microwaves.[9]

2- Sources of ionizing radiation:

The Algerian legislator defined a "source of ionizing radiation" in Article 4 of Law No. 19-05 as any radioactive source or generator of ionizing radiation. Accordingly:

- Radioactive sources: emit ionizing radiation resulting from radioactive decay.
- Ionizing radiation generators: devices that emit radiation through external energy input.

Medical exposure sources are divided into two types according to Article 2 of the Ministerial Decision of 10 November 2015: diagnostic sources and therapeutic sources, mainly including imaging techniques, nuclear medicine, and radiotherapy.

Earlier, Article 3 of the Joint Ministerial Decision of 10 February 1988 which defines the procedures for the possession and use of radioactive materials and devices that generate ionizing radiation for medical purposes[10]; the devices that generate ionizing radiation and radioactive materials are as follows: detailed these as:

- Diagnostic devices (radiography, fluoroscopy, dental imaging);
- Therapeutic devices (radiotherapy, gamma therapy, particle accelerators);
- Natural[11] and artificial radioactive[12] elements used in diagnosis, treatment, and experimentation, in sealed or unsealed forms[13].

In sealed form, pellets and wires intended for intracavitary therapy, needles for brachytherapy, needles and plates.

However, one may ask why these techniques were included in a text issued in 1988, whereas technologies are constantly evolving. The Algerian legislator therefore took into account the need to update the techniques and protocols used in medical procedures involving exposure to ionizing radiation in line with technological developments. Accordingly, Article 7 of the Order dated 10 November 2015, which sets the rules of optimization and reference levels for medical exposures intended for health professionals, stipulates that:

«The qualitative justification of medical procedures involving exposure to ionizing radiation is carried out by an expert committee established within the ministry responsible for health, which approves the related protocols.
The protocols are updated whenever necessary, in light of technological and scientific developments.»

B- The legal nature of the risks of ionizing radiation:

The annex of the Joint Ministerial Decision dated 8 June 1997[14] classified work involving exposure to ionizing radiation (such as X-rays and radioactive materials) among high-risk occupational activities.

The term “occupational risks” includes both workplace accidents and occupational diseases, which differ in concept and effects. This raises the question: are ionizing radiation risks considered work accidents or occupational diseases?

The Algerian legislator defined “work accident” in Article 6 of Law No. 83-13 as: “Any accident causing bodily injury resulting from a sudden cause occurring within the framework of the employment relationship.”[15]

Thus, a work accident requires:

- Bodily injury;
- A sudden cause;
- Occurrence within the employment relationship.

In contrast, occupational diseases [16]were not explicitly defined but described in Article 63 as: “All symptoms of poisoning, infection, or illness attributed to a specific occupational source.”

From this, it appears that:

- The legislator did not link occupational disease to a specific time;
- It may appear even after the end of employment.

This broad definition is due to the diversity and technical nature of occupational diseases.[17] Therefore, the legislator adopted a system of tables listing occupational diseases and related activities (Article 64 of Law No. 83-13).

Indeed, this regulation was issued in the form of the Joint Ministerial Order dated 05 May 1996, which sets out the list of diseases that may have an occupational origin, along with its Annexes 1 and 2.[18]

This order includes 84 tables; Table No. 6, shown below, lists occupational risks resulting from stray (ionizing) radiation as occupational diseases.

Table No. 6: Diseases resulting from ionizing radiation exposure

Designation of diseases	**Latency / exposure period**	**Occupational activities likely to cause these diseases**
Anemia; thrombocytopenia; or leukopenia associated with continuous exposure to ionizing radiation or radioactive materials	90 days; 1 year	All activities involving exposure to ionizing radiation and radioactive materials in industrial or laboratory activities; or any work involving medical use of ionizing radiation
Chronic leukemia; blood cancers linked to continuous exposure	90 days; 1 year	Medical exposure activities using ionizing radiation
Skin cancer	10 years	Exposure to ionizing radiation
Acute radiation injury	90 days	Work involving ionizing radiation sources
Chronic radiation injury	10 years	Work involving ionizing radiation sources
Radiation-induced eye disorders (cataracts)	90 days	Occupational exposure to radiation in diagnostic or therapeutic contexts
Radiation-induced infertility and reproductive disorders	5 years	Medical and industrial radiation exposure activities
Genetic mutations	30 years	Exposure to ionizing radiation
Congenital malformations	30 years	Exposure to ionizing radiation
Bone marrow diseases	50 years	Exposure to ionizing radiation

However, the aforementioned diseases may be classified as “work accidents” if the effect of the harmful factor is sudden, in accordance with the provisions of Article 2 of the above-mentioned joint ministerial decision.

It should also be noted here that the legislator requires the concerned person to declare the occupational disease within a period ranging from 15 days to 3 months following the first medical examination of the patient.

Second: Legal recognition of the right of health professionals to protection from the risks of ionizing radiation:

In its concern to ensure protection for health professionals from the risks of ionizing radiation, the Algerian legislator has established a set of legal texts enshrining this protection, ranging from the Constitution to laws and regulations. It should be noted that the nature of the obligation to guarantee the right of health professionals to prevention and safety from ionizing radiation risks can only be determined through a comprehensive review of all legal texts. However, these legal sources vary between those providing general protection for workers against occupational risks and those providing specific protection against ionizing radiation risks.

Accordingly, based on this distinction, we will address in this section the general rules first, followed by the special rules. This review reflects a historical development of legal texts enshrining workers' protection from occupational diseases, including both amended and repealed provisions.

1. Constitutional recognition of the fundamental right of workers to protection from occupational risks:

The Algerian Constitution constitutes a founding source of obligations relating to occupational protection and safety. This right was enshrined in Article 66 of the 2020 constitutional amendment:[19]

"Work is a right and a duty.

Each work shall be remunerated.

The law guarantees the right to protection, safety and hygiene during work..."

From the above text, the following observations may be made:

- The constitutional recognition of workers' right to protection and occupational safety reflects the higher will of the State to give importance to this issue;
- Protection, safety, and hygiene are considered obligations guaranteed by law and not borne directly by the State. This means that this obligation is imposed by law on several parties, primarily the employer, in line with Algeria's liberal economic orientation;
- The constitutional legislator did not mention prevention explicitly but referred to protection and safety.[20]

2. General legislation and regulations:

Based on the phrase "the law guarantees" contained in Article 66 of the 2020 constitutional amendment, it is understood that the constitutional legislator delegated the determination of the modalities of exercising these rights to legislation. These legal texts are diverse, including both legislative and regulatory instruments, as well as general and special provisions.

The Labour Law No. 90-11[21] is the main source of this obligation, pursuant to Article 5 (paragraph 5), which states:

"Work enjoys the following fundamental rights:

- Health prevention, safety and occupational medicine."

However, the Labour Law is not the only source of the obligation to ensure prevention and safety from occupational risks. It is complemented by laws relating to health protection and promotion, including Law No. 18-11 on health, as amended and supplemented by Ordinance

No. 20-02, whereby the State ensures health protection in the workplace and its promotion, in accordance with Article 97 thereof.

In addition, Law No. 83-13 on work accidents and occupational diseases, which aims to address occupational diseases resulting from workplace hazards.

The legislator later sought to establish preventive solutions before the occurrence of occupational diseases, as provided in Law No. 88-07 laying down general rules in the field of health and safety at work.

The legislator further developed detailed and technical issues through regulations, including:

- Presidential Decree No. 07-279
- Presidential Decree No. 05-117
- Executive Decree No. 05-11 of 08 January 2005, defining the conditions for establishing, organizing and operating the occupational health and safety service and its competencies
- Executive Decree No. 05-10 of 08 January 2005, defining the powers, composition, organization and functioning of the inter-company occupational health and safety committee
- Executive Decree No. 05-09 of 08 January 2005, relating to the joint committee and occupational health and safety delegates
- Executive Decree No. 05-08 of 08 January 2005, relating to special rules applicable to hazardous substances and materials in the workplace
- Executive Decree No. 02-427 of 07 December 2002, relating to organization, education, information and training of workers in occupational risk prevention
- Executive Decree No. 96-209 of 05 June 1996, defining the composition, organization and functioning of the National Council for Occupational Health, Safety and Occupational Medicine
- Executive Decree No. 93-120 of 15 May 1993, relating to occupational medicine organization
- Executive Decree No. 91-05 of 19 January 1991, relating to general protective rules applicable to hygiene and safety at workplaces
- Decree No. 86-132 of 27 May 1986, defining rules for protecting workers from ionizing radiation risks and controlling radioactive materials and radiation-generating devices
- Ministerial Decision of 10 November 2015 defining priority rules and exposure levels for medical exposure of health professionals
- Joint Ministerial Decision of 09 June 1997 establishing the list of jobs exposing workers to serious risks
- Decision of 10 February 1988 defining procedures for possession and use of radioactive materials and ionizing radiation devices for medical purposes

Third: Health professionals covered by protection against ionizing radiation risks:

1. Conditions required for health professionals benefiting from protection:

The Algerian legislator limited the practice of medical radiation activities to a specific category of qualified health professionals. This is confirmed by the use of the terms “qualified” and

"authorized for this purpose" in Article 4 of the Ministerial Decision of 10 November 2015, which states:

"Medical exposure for diagnostic or therapeutic purposes shall be practiced only by qualified health professionals authorized for this purpose by the competent services of the Ministry of Health, and no others, in accordance with applicable regulations."

But what is meant by "health professionals"? This term includes several categories governed by different legal texts.

According to Article 2(1) of the Decision of 10 February 1988, authorization to use ionizing radiation for medical treatment is granted only to specialists approved by the Minister of Health, namely: physicians, pharmacists, biologists, and dental surgeons.

These professionals must meet the general conditions set out in Article 166 of Law No. 18-11, which states:

"The practice of health professions is subject to the following conditions:

1- Algerian nationality;

2- Possession of the required Algerian diploma or equivalent;

3- Enjoyment of civil rights;

4- No criminal conviction incompatible with the profession;

5- Physical and mental fitness compatible with the profession;

Health professionals must register with their professional order."

In addition, they must meet special conditions related to specific expertise obtained through authorization from the Minister of Health to work with ionizing radiation.

Thus, the following fall within the category of health professionals concerned:

- Medical practitioners performing radiography;
- Medical practitioners administering radioactive pharmaceutical substances for diagnostic or therapeutic purposes;
- Specialized medical practitioners and medical physicists.

2. Restrictions on the practice of radiological medicine:

The Algerian legislator imposed restrictions on authorization to practice radiological medicine due to protection requirements related to the nature of vulnerable persons, particularly age-related protection.

- **Trainee students:** Article 17 of Presidential Decree No. 05-117 prohibits employing workers under 18 years of age in work involving ionizing radiation, except for training or apprenticeship purposes starting from 16 years.
- **Pregnant women:** According to Article 36 of Presidential Decree No. 05-117, any woman working in a radiation-related job must inform her employer and occupational physician as soon as she becomes aware of her pregnancy so that she may be reassigned to a suitable position if necessary, based on the occupational physician's opinion.

Chapter Two: Administrative protection of the right of health professionals to prevention and safety from ionizing radiation risks:

The Algerian legislator has provided a set of measures and conditions imposed on employers to protect health professionals from exposure to ionizing radiation. These measures include

medical protection, equipment standards, and workplace safety standards. Control bodies are also established to ensure compliance.

First: Conditions for possession and use of radioactive materials and ionizing radiation sources used for medical purposes:

The employer must provide equipment and devices in accordance with regulatory standards to protect health professionals exposed to ionizing radiation or at least reduce such risks.

In this context, the Decision of 10 February 1988 defined these standards in Articles 4 to 11, which include:

1. Conditions related to the use of radiological diagnostic devices:

- The table and its support must be equipped with a protective device shielding examiners and users from direct and secondary radiation;
- The facility must include elements reducing beam size and intensity to the minimum required for examination;
- The source and screen must be properly aligned and/or properly arranged.

2. Conditions related to radiographic imaging devices:

In addition to the above conditions:

- Rooms must have sufficient space to allow movement around equipment and ensure adequate distance between workers and the radiation source;
- Areas where workers may stand and be exposed during operations must be protected, such as the control booth.

3- Conditions related to dental radiography devices:

In addition to the previous conditions:

They must be equipped with an appropriate protection device;

The beam section must be limited to the point to be X-rayed.

4- **Conditions related to devices used for Röntgen therapy:**

It is not permitted to install more than one radiotherapy device in the same location;

Control panels must be placed outside the treatment room;

The observation window, if any, must provide the same protection guarantees as internal barriers.

5- **Conditions related to devices used for gamma ray therapy**:

In addition to all previous conditions:

They must be equipped with a device against uncontrolled release or against dispersion of the radiation source.

6- Conditions related to the use of particle accelerators:

The user must be assisted by persons capable of operating and maintaining these devices;

Continuous ventilation must be ensured during the use of the high-voltage device.

7- Conditions related to radioactive elements:

Availability of remote control means or devices, if the nature of the operation of radioactive elements requires it;

Continuous verification of the safety of sources used in radiotherapy through brachytherapy and contact radiotherapy. Needles and plates containing radioactive sources must be inspected at least once a year.

8- Containers, casings of bottles, and capsules containing radioactive materials used for medical purposes in unsealed form must bear symbols and information intended to inform persons of the risks posed by these materials, as well as information on their nature and physicochemical composition, their level of activity from the date of preparation to their expiry date, mid-term validity, and method of use.

9- Access to premises where devices generating ionizing radiation and radioactive materials are used shall be restricted to practicing physicians, patients, and persons whose presence is necessary for the medical procedure.

Second: The authorization regime

From reading Articles 1/2, 2 and 3, it is inferred that the Algerian legislator has stipulated that the possession and use of radioactive materials, ionizing radiation-generating devices, and ionizing radiation sources for medical purposes are subject to an authorization regime, as an obligation falling upon hospital institutions, whether public or private, due to the seriousness of the effects resulting from the use of ionizing radiation (random and deterministic effects).

1- Concept of authorization:

- **Definition of authorization:** The Algerian legislator defined the "license" in Annex III of Presidential Decree No. 05-117 as:

«An authorization granted by the regulatory authority in the form of a document to a natural or legal person who has requested to carry out an activity or any other procedure falling within the scope of the applicable regulations.»

However, several observations may be made regarding the above definition: The definition is criticized for not explicitly stating that the exercise of the activity and its legal validity depend on obtaining prior authorization; in other words, it does not explicitly state that it is a prior permit.

The phrase "within the scope of the applicable regulations" requires reference to Article 1 of Presidential Decree No. 05-117, as it defines the general framework of this regulation, which includes two parts:

♣ The first part relates to general rules for protection against the dangers of ionizing radiation, including those resulting from medical exposure. Whether related to importation, transit, manufacturing, transformation, use, processing, transport, storage, disposal, and elimination of radioactive materials.

♣ As for the second part, it relates to the rules for authorization of possession and use of radioactive materials and ionizing radiation-generating devices, including those intended for medical purposes.

From the above, it is understood that the authorization regime is limited to the possession and use of radioactive materials, without explicitly requiring it for the other operations mentioned in paragraph 1 of Article 1 such as importation, manufacturing, processing, etc.

The definition does not mention the purpose of authorization, which should be to reduce the misuse of ionizing radiation and limit its risks.

Obtaining authorization is linked to activities that exceed the exemptions provided for in Article 3 of Presidential Decree No. 05-117. Otherwise, a declaration is sufficient.

2.Entities concerned with obtaining authorization:

Pursuant to Article 6 of Presidential Decree No. 05-117, the granting of authorization is not limited to legal persons only but also includes private individuals. This is confirmed by Annex III of the same decree in the part defining "license".

It appears from the above that the concept of legal person is not limited to public legal persons only; rather, the wording is general, suggesting that it includes private legal persons, especially since the legislator also granted this possibility to private individuals. Accordingly, it may be inferred that private clinics may legally possess and use radioactive materials and ionizing radiation devices and sources for medical purposes.

But can this be achieved in practice?

In this context, five (05) authorizations were granted between 2009 and 2011. However, surprisingly, four of them were granted by the Secretary-General of the Ministry of Health, while the fifth was granted by the Director of Planning at the Ministry of Health. These authorizations were granted to clinics located in Constantine, Blida, and Al Azhhar Clinic in Dely Ibrahim.

However, the Ministry of Health later cancelled these authorizations. This was justified for two reasons:

- Cancer control is part of radiotherapy procedures. At that time (2009–2011), the competence to grant authorization for the use of health institutions of radioactive materials and ionizing radiation sources belonged to the Atomic Energy Commission, which alone had this authority pursuant to Article 03 of Presidential Decree No. 05-117.
- Given the risks arising from the use of medical radioactive materials and sources, this technology requires specific standards that are lacking in the private sector and are available only in the public sector.

All of this leads to the necessity of revisiting Article 6 of Presidential Decree No. 05-117 by clarifying the meaning of "legal person." If it includes private legal persons, they must be subject to additional conditions included in a set of specifications.

3- Procedures for obtaining authorization:

Pursuant to Article 03 of Presidential Decree No. 05-117, the Atomic Energy Commission is responsible for granting authorization.

In detail, among the tasks assigned to the Atomic Energy Commission in the field of protecting persons, property, and the environment from the effects of ionizing radiation, pursuant to Article 4 of Presidential Decree No. 07-279, are the following:

Issuing authorizations for activities involving ionizing radiation sources, or modifying, suspending, or withdrawing them;

Preparing and maintaining national registers of ionizing radiation sources and inventories of radioactive materials

Carrying out inspections and control operations in establishments containing radiation sources or nuclear materials;

Approving safety and security devices prepared by users of ionizing radiation sources.Accordingly, any natural or legal person intending to carry out any of the operations, practices, or activities related to ionizing radiation or its sources as set out in Article 1 of Presidential Decree No. 05-117, as amended by Article 1 of Presidential Decree No. 07-171, must submit an application to the Atomic Energy Commission to obtain authorization for possession and use of ionizing radiation or ionizing radiation sources intended for medical purposes.

The application must be accompanied by:

A statement of the radioactive sources intended for use;

All necessary data and information confirming compliance with radiation protection rules. It should be noted that the Atomic Energy Commission may add special conditions for obtaining the license.

This application is sent to the Atomic Energy Commission, which issues a decision within a maximum period of two (02) months. It must also justify any rejection of the application, pursuant to Article 8 of Presidential Decree No. 05-117.

The duration of the license varies according to the risks associated with the activity and considerations of specificity and appropriateness; however, the maximum duration is five (05) years. In this case, a renewal request must be submitted three (03) months before the expiry of the license; and any change in the authorized activity must be declared in the renewal request.

In contrast, it is noted that, under Law No. 19-05 on nuclear activities, the power to grant authorizations for any activity related to nuclear materials has been assigned to the Authority for Nuclear Safety and Security.

However, in reality, the competence of this authority is not related to granting authorizations in the medical field. This conclusion is supported by several indicators, including:

- The absence of any legal text in the recitals and references relating to the protection of workers from the risks arising from ionizing radiation in general, and health professionals in particular, which explains the lack of connection between this law and this field; it is related only to nuclear installations.
- The lack of connection between this law and the medical field is confirmed by Article 4 of Law 19-05, particularly the definition of a nuclear installation, which states: «A nuclear installation: any installation, including land, buildings, and related equipment, in which nuclear materials are produced, processed, handled, stored, or disposed of on a scale requiring nuclear safety and security and radiation protection measures. These installations include:

4- Any particle accelerator used or producing radioactive or nuclear materials other than those intended for medical use,»

Third: Medical protection

The employing institution is responsible for providing occupational medicine. The availability of occupational medicine within the institution reduces many occupational diseases through

two steps: prevention of occupational diseases and monitoring them when detected. This role of the occupational physician is confirmed by Articles 12 to 18 of Law No. 88-07 on health prevention, safety, and occupational medicine, as amended and supplemented by Law No. 17-11, where the occupational physician's profession is essentially preventive and sometimes therapeutic.

Pursuant to Articles 13 and 14 of Law No. 88-07, occupational medicine is an obligation incumbent upon the employing institution. The latter must establish an occupational health service when the time required for the occupational physician's duties equals or exceeds the monthly legal working time applicable to the medical corps according to the standards set in Article 3 of Executive Decree No. 93-120 on the organization of occupational medicine, pursuant to Article 2 of the same decree.

If the establishment of an occupational health service is not possible, the employing institution must:

Either contribute to the establishment of an inter-institutional occupational health service on a regional basis;

Or conclude an agreement with the health sector, according to a model agreement;

If the health sector cannot respond to the request of the employer, the latter must conclude an agreement with any structure specialized in occupational medicine or any qualified physician.

Every worker is mandatorily subject to the following medical examinations:

- Pre-employment medical examination, pursuant to Article 17 of Law No. 88-07 and Article 13 of Executive Decree No. 93-120;
- Job transfer examination, pursuant to Article 14 of Executive Decree No. 93-120;
- Return-to-work examination, pursuant to Article 17 of Law No. 88-07 and Article 17 of Executive Decree No. 93-120;
- Periodic medical examination: of two types—at least once a year for all workers, and special periodic examinations twice a year for specific categories of workers listed in Article 16 of Executive Decree No. 93-120; this category includes workers particularly exposed to occupational hazards.

The worker may also benefit from spontaneous examinations upon request or at the discretion of the occupational physician, pursuant to Article 18 of Executive Decree No. 93-120.

The employing institution is bound by the opinions of the occupational physician.

Conclusion

If technological developments, including the use of radiation, have given a qualitative boost to the medical sector, these developments have also brought many types of diseases, particularly affecting health professionals as a result of excessive exposure to ionizing radiation. This has necessitated the adoption of measures and precautions ensuring health and safety protection for health professionals against the risks of such radiation exposure.

In this context, through this research paper we reached a set of results, the most important of which are:

- Damage resulting from ionizing radiation is among the most serious harms affecting health professionals.

- The Algerian legislator addressed the issue of protection from ionizing radiation hazards in numerous scattered laws, difficult to fully grasp, and characterized by ambiguity in many terms, as well as overlap without cross-referencing.
- The sources of legal protection for health professionals vary between constitution, law, and regulation, both public and private.
- Conditions for employing health professionals in the field of ionizing radiation are unclear.
- The legislator did not precisely define the category of health professionals concerned with protection.
- The Algerian legislator separated the sources of medical exposure to ionizing radiation in old texts dating back to the 1980s.
- The legislator did not define the concept of occupational diseases and only provided a list of such diseases through a ministerial decree issued in 1996 without updating it.
- The legislator imposed a set of technical measures on the employing institution concerning the conditions of use and possession of ionizing radiation materials used for medical purposes, without covering transit, transformation, and storage operations.
- There is confusion in understanding the jurisdiction of the Atomic Energy Commission, the Minister of Health, and the Authority for Nuclear Safety and Security.
- Licenses granted to private clinics were cancelled.
- In practice, health professionals are not subject to periodic medical examinations.

In contrast to these results, we propose the following recommendations:

• Consolidating and updating the shared legal texts.

• Clearly stipulating the competence conditions required for health professionals exposed to ionizing radiation.

• Clearly and precisely defining the category of health professionals subject to ionizing radiation exposure and thus protection.

• Updating the list of occupational diseases.

• Extending the authorization regime to include importation, transit, storage, etc.

• Clearly and explicitly distinguishing between the competencies of the Atomic Energy Commission, the Minister of Health, and the Authority for Nuclear Safety and Security.

• Granting licenses to private clinics to practice these activities, but under strict and specific conditions.

• Introducing occupational medicine within the health sector.

List of footnotes and references

[1] Ben Hamich Abdel Karim and Ould Omar Tayeb, "Protection of Workers from Nuclear Radiation under Algerian Environmental Legislation," Journal of Labour Law and Employment, Vol. 5, No. 1, June 2020, pp. 184–199, p. 190

[2] They occur only at very high levels of exposure and after a specific dose determined for each organ of the human body.

[3] They occur at any level of radiation exposure, even at low radiation doses.

[4]Law No. 19-05 dated 17 July 2019, concerning nuclear activities, Official Journal No. 47, issued on 25 July 2019.

[5] Presidential Decree No. 05-118 dated 11 April 2005, concerning food safety, Official Journal No. 27, issued on 13 April 2005

[6]Directorate of Commerce of the Wilaya of Biskra, available at: https://www.dcwbiskra.dz/index.php?option=com_content&view=article&id=234&Itemid=83

[7] Directorate of Commerce of the Wilaya of Biskra, ibid.; Hamidani Mohamed, "Administrative Protection of the Work Environment from Ionizing Radiation Pollution in Algerian Legislation," Journal of Legal and Economic Research, University of Alexandria, No. 1, 2009, p. 191.

[8] Mahmoudi Fatima and Zedhour Engi Hind Najwa Rym Sundus, The Authorization System as a Means of Protecting the Patient from Medical Radiation Practices in Algerian Law.

[9] Directorate of Commerce of the Wilaya of Biskra, op. cit.

[10] oint Ministerial Order dated 10 February 1988, which sets the procedures for the possession and use of radioactive materials and ionizing radiation-generating devices for medical purposes, Official Journal No. 35, issued on 31 August 1988

[11] Natural sources: these are not influenced by human intervention. They consist of three sources: cosmic radiation, terrestrial radiation, and natural radiation within the human body.

[12] Industrial sources: these result from human activity, where humans intervene by altering and disrupting the proton-to-neutron ratio in the atoms of elements, leading to the emission of quantities of "alpha," "beta," and other types of radiation.

[13] Sealed source: a radioactive material which is (a) permanently sealed inside a capsule, or (b) tightly enclosed in solid form. The capsule or material of the sealed source must be sufficiently durable to prevent leakage under the conditions of use and wear for which it was designed, as well as in the event of foreseeable accidents.

[14] Joint Ministerial Order dated 9 June 1997, which sets the list of jobs in which workers are heavily exposed to occupational risks, Official Journal No. 75, issued on 12 November 1997.

[15] Law No. 83-13 dated 2 July 1983, relating to work-related accidents and occupational diseases, Official Journal No. 28, issued on 5 July 1983.

[16] International Recommendation No. 67 of 1944 concerning income security defined occupational diseases as: «Any disease that occurs frequently among workers in a given occupation, or any poisoning caused by substances used in a specific profession, which must be compensated as an occupational disease if the person is employed in that occupation.» However, Algeria did not ratify this recommendation. Quoted from: Jehl Mohamed, Work Environment and Occupational Health and Safety Obligations in Algerian Legislation, Doctoral thesis in Social Law, Faculty of Law and Political Science, University of Oran 2, 2017–2018, p. 228.

[17] Jehl Mohamed, ibid., pp. 228, 229, 236.

[18] Joint Ministerial Order dated 5 May 1996, establishing the list of diseases that may have an occupational origin, Annexes 1 and 2, Official Journal No. 16, issued on 23 March 1997.

[19] Presidential Decree No. 20-442 dated 30 December 2020, concerning the promulgation of the constitutional amendment approved in the referendum of 1 November 2020, Official Journal of the People's Democratic Republic of Algeria, Official Journal No. 82, issued on 30 December 2020.

[20] Jehl Mohamed, op. cit., p. 57.

[21] Law No. 90-11 dated 21 April 1990, relating to labour relations, Official Journal No. 17, issued on 25 April 1990.