



Initial education programme for radiation therapists in France

The initial training to become a radiation therapist (RTT) is heterogeneous in Europe [Coffey et al., 2022]. Some countries offer a specific education programme for RTTs, while others have combined programmes that cover diagnostic radiography, nuclear medicine and radiation therapy. The duration of the programmes also differs; it ranges from two to four years according to the country. The initial training in France is a combined three-year programme, but the radiation-therapy-specific content is among the smallest of such sections in all the European programmes. The objective of this article is to share with readers the education programme in France and the current considerations to improve the programme.

General presentation

A French RTT must gain one or both of the following degrees to practise:

- the *diplôme d'état de manipulateur d'électroradiologie médicale* (state diploma in medical electroradiology), which is delivered by the healthcare ministry; or
- the *diplôme de technicien supérieur en imagerie médicale et radiologie thérapeutique* (higher technician diploma in medical imaging and therapeutic radiology), which is delivered by the higher education ministry.

The programme, which is defined by the training reference document, is the same for both diplomas and comprises 180 credits under the European credit transfer and accumulation system (ECTS), which is equivalent to a bachelor's degree. This programme is composed of 2100 hours of theoretical training that is offered through lecture courses and tutorials, and 2100 hours of practice and clinical training, which is achieved during several internships.

The theoretical frame of training, written in 2016, includes law, social and human sciences (seven ECTS credits), life sciences, sciences of matter and medical sciences (21 ECTS credits), technical and scientific methods used in diagnostic and therapeutic medical imaging, radiation therapy and function tests (21 ECTS credits), technical and scientific interventions in diagnostic and therapeutic medical imaging, radiation therapy and function tests (38 ECTS credits), integration of knowledge and professional position (23 ECTS credits), work tools and methods (10 ECTS credits) and internship (60 ECTS credits). This is explained in the *Titres et diplômes | Ministère de l'Education Nationale et de la Jeunesse, Santé, Protection sociale, Solidarité*, numéro six, published on 15 July 2012 [solidarites-sante.gouv.fr].

Trainees undertake 60 weeks of internship in different institutions. Modalities include radiology, CT scan, MRI, interventional radiology, nuclear medicine and radiation therapy. The internships are split across the three years.

The objectives of this programme are to develop the 10 following competencies or abilities:

- to analyse the clinical situation of the patient and to determine the modalities of care that should be performed;
- to realise the diagnostic and therapeutic care required in medical imaging, nuclear medicine, radiation therapy and functional exploration, ensuring the continuation of care;
- to manage information linked to the delivery of diagnostic and therapeutic care;
- to follow the radioprotection rules for patients, staff and the public;
- to follow the principles of quality, hygiene and security to ensure the quality of care;
- to evaluate and improve his/her professional practice;
- to organise his/her activity and to collaborate with other healthcare professionals;
- to inform and teach; and
- to research and use professional and scientific data.

Some professionals who work in the colleges are managers in healthcare or have worked as radiographers or RTTs. However, in some colleges, they are education professionals.

Content that is radiation-therapy specific

The radiation-therapy content is divided into five units, which are presented below.

Title	Objectives
Physics and technology of radiotherapy (two ECTS credits)	<ul style="list-style-type: none"> Pinpoint the specificities of the radiations used in radiotherapy Describe the principles of how equipment functions Pinpoint the particular attributes of the imaging devices used for dosimetry planning Describe the physics features of the beams Explain the principles of the beam modification devices Know the impact of different parameters on the treatment Know the risks linked to the use of treatment equipment
Oncology (one ECTS credit)	<ul style="list-style-type: none"> List the factors that lead to carcinogenesis Describe the modalities of prevention and screening Describe the main mechanisms of tumour growth and dissemination Describe the main diagnostic and therapeutic modalities in oncology Integrate the public-health issues that are linked to cancer: personal and socio-professional impact, healthcare organisation, interdisciplinary, prevention
Introduction to radiotherapy and dosimetry (two ECTS credits)	<ul style="list-style-type: none"> Describe the organisation of the radiotherapy department and its position in the network of groups that study cancer Integrate the missions of RTTs and collaboration with other radiotherapy actors Analyse the patient pathway in radiotherapy Understand the elements of security Understand the concepts of beam ballistics Integrate fundamental knowledge of dosimetry into external radiotherapy Understand the technicalities of virtual simulation Identify the elements of a dose-volume histogram Identify the elements of data transfer and security Explain the technical aspects of in-vivo dosimetry
External radiotherapy and brachytherapy, first part (two ECTS credits)	<ul style="list-style-type: none"> Be able to treat tumours in thoracic, abdominal and pelvic locations Explain the treatment modalities in external radiotherapy Execute security and quality-control measures
External radiotherapy and brachytherapy, second part (two ECTS credits)	<ul style="list-style-type: none"> Be able to treat tumours in the head and neck, and skeleton, and use various techniques Execute brachytherapy protocols Execute security and quality-control measures Explain the treatment modalities used in external radiotherapy and brachytherapy

Every college plans its lecture courses and tutorials to teach the theoretical frame of these units. Radiation oncologists, medical physicists, RTTs and dosimetrists can deliver lectures, and the choice of lecturer may be different among the colleges.

Perspectives

Completion of a combined programme of training is a challenge. Becoming a good professional in radiology, nuclear medicine and radiation therapy requires a solid education in three different disciplines. The theoretical training framework is required to standardise education across colleges, but the quality of each training programme depends on the managers or the education professionals at the college. It also depends on the abilities of the professionals of the clinics and hospitals who want to deliver lectures.

Last year, a college asked me to deliver a lecture about treatment techniques, and it asked a medical physicist to deliver a lecture about patient positioning and immobilisation in radiation therapy. When I discovered this plan, I asked that our lectures be switched so that the teachers would be more relevant to the subjects. This anecdote is a reflection of the situation in many colleges and other teaching institutions.

In parallel, we have observed that students lack interest in radiation therapy and that it has been difficult to hire RTTs for many years before there was a shortage of healthcare workers.

Unfortunately, at present, a dedicated programme for RTTs is unlikely to be created in France.



This experience, these observations and my involvement in education and the national professional committee of RTTs in France, encouraged me to do something. My plan is composed of two steps:

- the perception of students at several colleges, who are reaching the end of their training, must be explored regarding the idea of working in radiation therapy: what are their perceptions of the discipline? What are their fears regarding working in radiation therapy departments? Can we improve their education to change their perceptions?
- a workshop should be organised to improve the theoretical training framework and to offer recommendations about the content of lectures and the professional categories of the teachers, based on the RTT core curriculum developed by ESTRO [ESTRO-RTT-Benchmarking-document_rebranded.pdf].

Conclusion

The provision of a good education is a challenge. Several countries, like France, offer a combined programme in RTT education. Even if this model seems not well adapted to the needs of education, it may be complicated to change it. The delivery of two French degrees managed by two ministries under the same theoretical framework but organised differently; the complexity of the planning of the lectures and tutorials; and the difficulties of finding radiation therapy professionals to deliver these courses, complicate the possibility to improve education for RTTs in France. The perspectives are suggestions of a first step to understanding fully the current problems of RTT education in France.



Sophie Boisbouvier
Radiation Therapist
Centre Léon Bérard
Lyon, France

