



# YOUNG

## The birth of high-energy radiotherapy and medical physics in France

Tributes were paid this year to Professor Jean Dutreix following the sad announcement that he had passed away. Among them was an article on the life of Jean Dutreix and his wife Andrée Dutreix [1]. As a young medical physicist, I found this article of great interest as it explained the birth of high-energy radiotherapy and medical physics in France. I thought it would be useful to summarise it for all the young (and not-so-young) professionals in radiation oncology.

Jean Dutreix's father Armand was an electrician who learned to repair radiology vehicles during WWI; he later expanded his repair business to hospitals. Jean Dutreix wanted to build dams instead, so he studied engineering. But during WWII, Jean Dutreix was involved in the Resistance with his father and they were imprisoned. Sadly, his father was killed; so when the war ended, Jean Dutreix decided to study medicine to take over the family business with his brother.

Andrée Dutreix's mother was a mathematician and her father reproduced drawings. Interested in the field of radioactivity, Andrée Dutreix studied maths, physics and electronics.

In 1949, nuclear medicine was a booming field. Maurice Tubiana, another Resistance fighter who had become a doctor of medicine in 1945 but left France after the war to study biophysics at the University of Berkeley in the US, returned to create a lab at the Necker Hospital in Paris to study the use of radio-isotopes for diagnostic and treatment purposes. Meanwhile, Jean Dutreix met his future wife, then Andrée Sigonneau, during their medical and science studies at the Radium Institute, where they worked together in the electronics lab.

After working in brachytherapy, Jean Dutreix joined Tubiana to study the use of iodine for the diagnosis of thyroid cancer. As for Andrée Dutreix, it was difficult at the time for a woman to find a job as a physicist. She was initially offered work as a secretary, and she learned to work on the first IBM computer in France.

In 1950, Frédéric Joliot, then France's High Commissioner for Atomic Energy, decided to acquire a Betatron particle accelerator for nuclear experiments. In order to share the cost of the accelerator, he set up a team with Tubiana, Jean Dutreix and Bernard Pierquin to develop the medical use of the Betatron at the Institut Gustave Roussy (IGR). By 1953, the Betatron was being used to treat patients in the morning and for physics experiments in the afternoon. A physicist was needed to measure doses delivered to the patients, but no physicist wanted to work in a medical environment, for fear of not doing any scientific work: Andrée Dutreix took on the challenge and she joined the team.

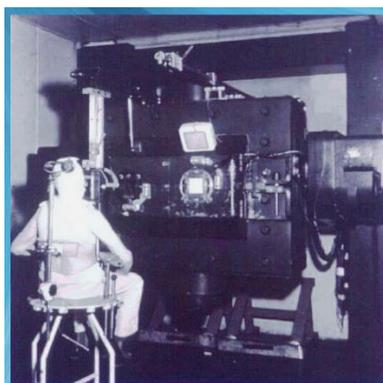


Figure 1. The Betatron (24 MeV)

Andrée Dutreix used maths and drawings to calculate treatment-dose distributions, combining both her parents' skills. Manual calculations were performed before the use of computers became possible. The first Fortran code written by Andrée Dutreix calculated brachytherapy-treatment doses on an IBM computer. She also worked to obtain recognition for the medical physicists' profession, and created the first medical physics diploma in France in 1970.

Meanwhile, Jean Dutreix spent six months in the United States and later completed a PhD on photon diffusion under the supervision of Louis de Broglie. He studied dose effects on tumours and healthy tissues, when only doses to the skin were known.



Figure 2: The team at IGR in 1952.

Front row: Bernard Pierquin (2nd from left), Maurice Tubiana (fourth from left) and Jean Dutreix (right)

Both Jean and Andrée Dutreix made great contributions to the field of radiotherapy. Among their achievements, they improved the sparing of healthy tissue, changed the practice from kilovolt to megavolt treatments, and developed radioprotection. They dedicated their time to radiotherapy alongside raising their children. Andrée Dutreix later became a teacher at Louvain University (Belgium) and head of a research group on quality control in radiotherapy.



Figure 3 Jean Dutreix (first from left), Andrée Dutreix (second from left), and Maurice Tubiana (fourth from left)

I would like to thank Natalie Pigeard, Denis Porcheron, Jean-Claude Rosenwald and Andrée Dutreix, who shared this piece of radiotherapy history with the radiation oncology community.



**Anne Gasnier**  
Radiotherapy physicist  
Gustave Roussy Cancer Campus,  
Paris, France

[1] Acteurs de la Physique Médicale: Andrée et Jean Dutreix (by Natalie Pigeard-Micault)  
[https://www.sfrp.asso.fr/medias/sfrp/documents/Andree\\_et\\_Jean\\_Dutreix.pdf](https://www.sfrp.asso.fr/medias/sfrp/documents/Andree_et_Jean_Dutreix.pdf)