EFOMP Travel Award for Young Physicist 2004

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My stay in Barcelona was a great opportunity to further my knowledge not only in the field of brachytherapy, but also to meet the people and learn about the culture. Barcelona is an exciting city, with technologically advanced hospitals and lovely people.

I stayed in Barcelona from September 13th until September 24th, 2004. The 24th was the *La Festa de la Mercè* (the patron saint of Barcelona) and I spent this local holiday, the last day of my visit, walking around the city centre, taking in the culture.

On the previous days I obviously worked to pursue the aim of my trip - to improve my theoretical knowledge in the field of brachytherapy.

I spent these two weeks at two different institutions. In the first week I worked at the Hospital Santa Creu i San Pau (HSCSP), and in the second one at the Institut Català d'Oncologia (I.C.O.). Dr Teresa Eudaldo (HSCSP) suggested this arrangement in collaboration with Dr Lizuiz (ICO), so that I could see and understand various methods for treating cancer with the brachytherapy technique.

In the two weeks I saw:

- LDR 0.5 – 2 Gy h^{-1}
- HDR > 12 Gy h^{-1}
- PDR
- Permanent prostate seeds implants
- Iridium wires

Hospital de la Santa Creu i Sant Pau

Moreover, I worked with the medical physics intern in quality assurance and in developing treatment plans.

The first treatment that I saw was an endometrium adenocarcinoma. The main treatment for endometrium cancer is surgery but it can be combined with external radiotherapy or brachytherapy. In this case, a 20 GY LDR BT followed surgery.

Dose calculation was made with CadPlan TPS (Varian), after two X-ray acquisitions at 0° and 90°. The physicist identified the sources and catheters as well as the points of organs at risk (OAR) such as the bladder (point nearest the source) and rectum (7-8 points at HSCSP, 3 points at ICO).
In LDR BT techniques, the patient stays in a protected room for several days and when staff go into the room, the source is unloaded. Relatives may visit the patient only for a few minutes as indicated on the door.

Another very interesting technique is HDR BT, mainly used for prostate and gynaecological cancer. Two X-rays films (0° and 90°) or a CT scan are performed. The target volume is identified and contoured by the physician. HDR treatment is administered through multi-sessions depending on total dose to the target.

The last BT technique I had the chance to see was permanent prostate seed implantation. In this case the patient undergoes a CT scan to identify the volume of the tumor, after which, in the surgical room, an ultrasound scan is taken to identify the shape and morphologic structure of the prostate, the bladder and the urethra.
To insert the seeds correctly in the prostate a template (grid) connected to an ultrasound probe is used. The US probe is useful to identify the seed's position and to avoid piercing the urethra. This template has to be subjected to a quality assurance test to assure the ultrasound image corresponds to the position of the seeds. These controls are made with an appropriate water phantom. Even though the controls are carried out monthly it depends on the number of treatments too.
There are two modalities to calculate the treatment plan:

- In *"real time"* techniques, the treatment planning system is located in the surgical room. Then, the medical physicist, in collaboration with the radiotherapist and/or the urologist, decide the number of seeds and their locations in order to obtain the best dose distribution in the prostate and to reduce the dose to the organ at risk.
- In *"pre-plan"* techniques, after the acquisition of US images, the medical physicist decides the number, the activity and the position of the seeds and checks the isodose distribution with the physician. When approved, the seeds are ordered and a few days later, they are implanted in the surgical room according to the "pre-plan" indications.

In both cases, after 30 days, a CT scan will be performed to check the final position of the seeds, because seeds may migrate from the tumour (prostate) to another organ. Obviously, the patient is informed about the care to be taken.

In LDR and HDR, quality assurance controls are performed by dosimetrists and consist of checking the security of various devices, the correct unloading of the sources and their positions.
In seed implantation, it is important to check the system template corresponds to the echographic scan, because errors in this step can cause displacement of the seeds and changes in the dose distribution to the target.

Both hospitals are well-equipped and many patients are treated with the brachytherapy modality.
These two weeks were fundamental in furthering my skills and improving my knowledge. It was all possible thanks to the medical physics staff at HSCSP and ICO and their accessibility. They spent a lot of time with me and allowed me to follow them around in their work, with competence and friendliness. I would especially like to thank Dr. Eudaldo (EFOMP Education, Training & Professional Committee), Dr Ribas (Head of the Medical Physics Dpt. - HSCSP), Dr. Lizuiaín (Head of the Medical Physics Dpt. – ICO), Dr. Candini (Aifm President), Dr. Bianchi (Aifm), and all the people who helped make my stay in Barcelona possible.

In conclusion, this experience has been very valuable in a scientific way, and also from a cultural and social point of view.