

## Seminar Announcement

**Wednesday**  
**October 26 2016**

Physics Building  
Room 103 @ 3:30 PM

### On the History of the Gamma Knife and Radiosurgery

**Guest Speaker: Valeriy V. Kostyuchenko**, Medical Physicist  
Gamma Knife Centre,  
Burdenko Neurosurgery Institute, Moscow, Russia

**Abstract:** We will discuss two things: Radiosurgery and the Gamma Knife, both of which have one “father” – an ingenious Swedish neurosurgeon Lars Leksell.

Leksell introduced the term Radiosurgery (RS) first time in 1951 when he found a way to make a small destruction deep in the brain without skull trepanation and damaging of more superficial parts of the brain for functional neurosurgery. To do it, he combined his own stereotactic apparatus – one of the first and most popular to this day, and multiple narrow beams of ionizing radiation. In 1967, the Gamma Knife appeared – the first dedicated tool for RS. There are many interesting crossings in this story: for example, we will discuss why the physicist Börje Larsson started to rear goats, and how in result he developed a cobalt gamma unit, being absolutely a “proton-man”. We will talk about how this device remains the “gold standard” in Radiosurgery, even though most other cobalt units in external beam radiotherapy have become the things of the past.

To understand the Leksell’s idea and its novelty, we must discuss the history of Stereotactic Neurosurgery, which started in the beginning of the XIX century with Clarke-Horsley’s works, and continued in the middle of the century by Spiegel and Wycis. We will also briefly discuss why the Canadian neurosurgeon and engineer Aubrey Mussen couldn’t be ahead of Spiegel and Wycis commonly recognized as inventors of human stereotaxy, even though Mussen’s apparatus had been developed twenty years earlier.

The second part of the history we must remember began at the same time, starting from Roentgen’s and Becquerel’s works. It is the history of Radiation Therapy, one of the most important tools of modern cancer treatment. We will briefly discuss the mechanism of radiation effect on the biological tissues, the connections with tumor genesis, and how RT can spare normal tissues from damages but kill tumors. We will also talk about the role the Manhattan project plays here.

We will follow the history of Gamma Knife development and innovations till now, answer why it is not commonly used for functional neurosurgery as Leksell dreamed, discuss why the Gamma Knife community believes that Radiosurgery is not Radiotherapy, and try to give a definition of Radiosurgery.

Finally, we will briefly discuss other RS devices, including Linac’s and Cyber Knife, and the future trends in the field.

