



# How to Combine Security and Safety of Radioactive Sources and Good Patient Service in Public of Large Hospitals

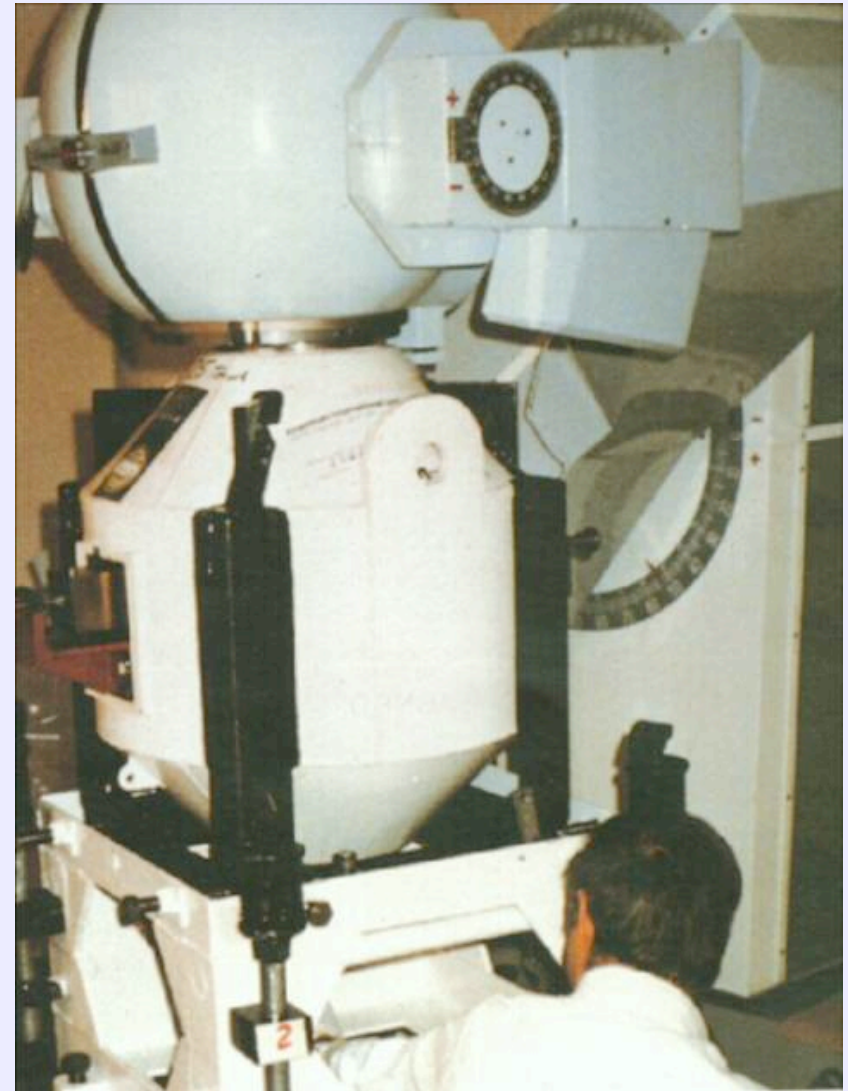


**J. Kopp, Klinikum Augsburg**  
**12th European ALARA Workshop, Vienna**

## Medical Sources

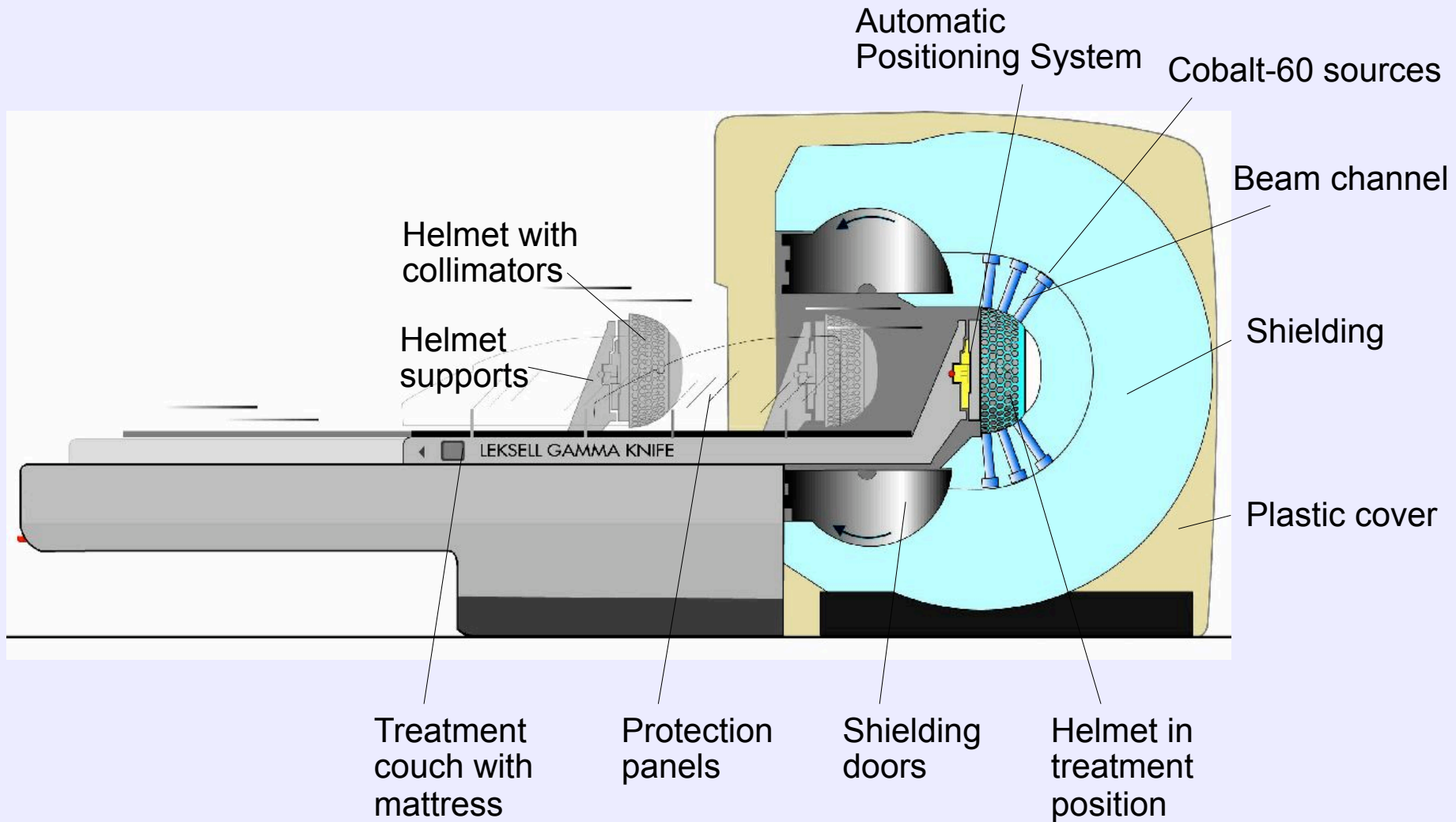
**External Beam Therapy  
Co-60 Teletherapy →  
replaced by accelerators  
in Germany since 2000**

**LEKSELL Gammaknife  
201 Co-60 sources  
with up to  
1330 GBq(36 Ci)/source**





# Leksell Gamma Knife® C





## Medical Sources

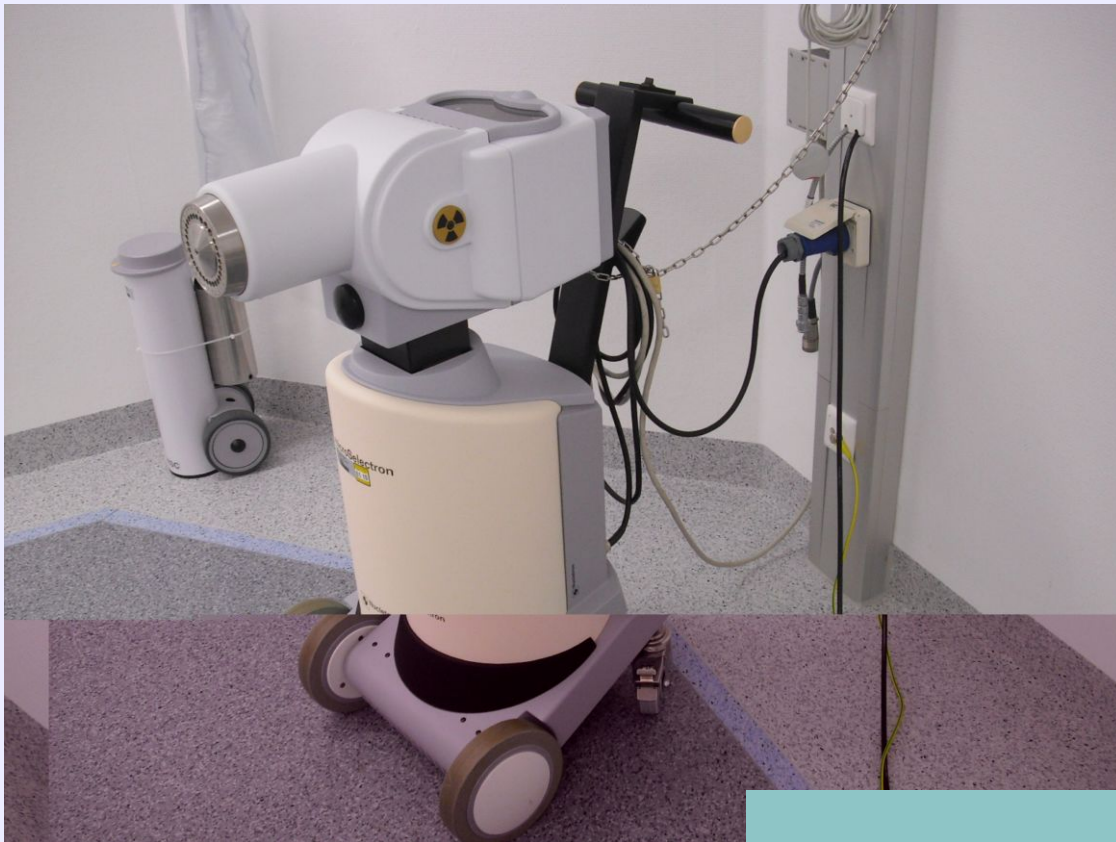
### Blood Irradiators

contain Cs137-Chloride!

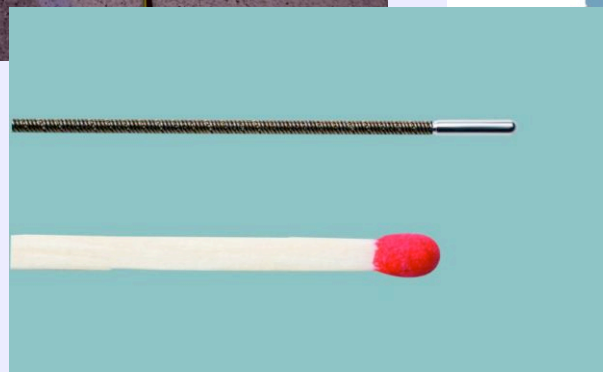
Activity 22 TBq – 185 TBq (600 – 5000 Ci)

### HDR-Afterloading devices

up to 600 GBq (16 Ci) Iridium192



**Afterloadingsystems**





# Blood Irradiators



## Devices with Built-in Sources

**PET**

**SPECT Gammakameras**

**Bone Densitometers**

➤ **Replaced by X-Ray**



## Mass-Spectrometers in Clinical Labs



## Other Sources

- Quality control and calibration sources
  - Sr-90, Cs-137, I-129, Co-57, Na-22, Ba-133 etc.
- Sources for LDR-Brachytherapy
  - I-125
- Radionuclide Generators
  - Mo-99/Tc-99m, Ge-68/Ga-68 etc.





## How to Provide Safety and Security in a Hospital?

### Organization

- Site Planning
  - „Closed“ departments but mix functional areas and offices or integrate the sources in areas that are on duty around the clock to gain „internal public“
  - Secure emergency exits but be aware that there might be smokers among your personnel
  - Keep the number of authorized people adequate - this includes cleaning personnel





## How to Provide Safety and Security in a Hospital?

### **Education and Training**

Make security an integral part of your safety culture

e.g. everyone entering should be identified by the staff - independent of status (patient, physician from other department, maintenance personnel etc.)

## How to Provide Safety and Security in a Hospital?

### Safety Installations

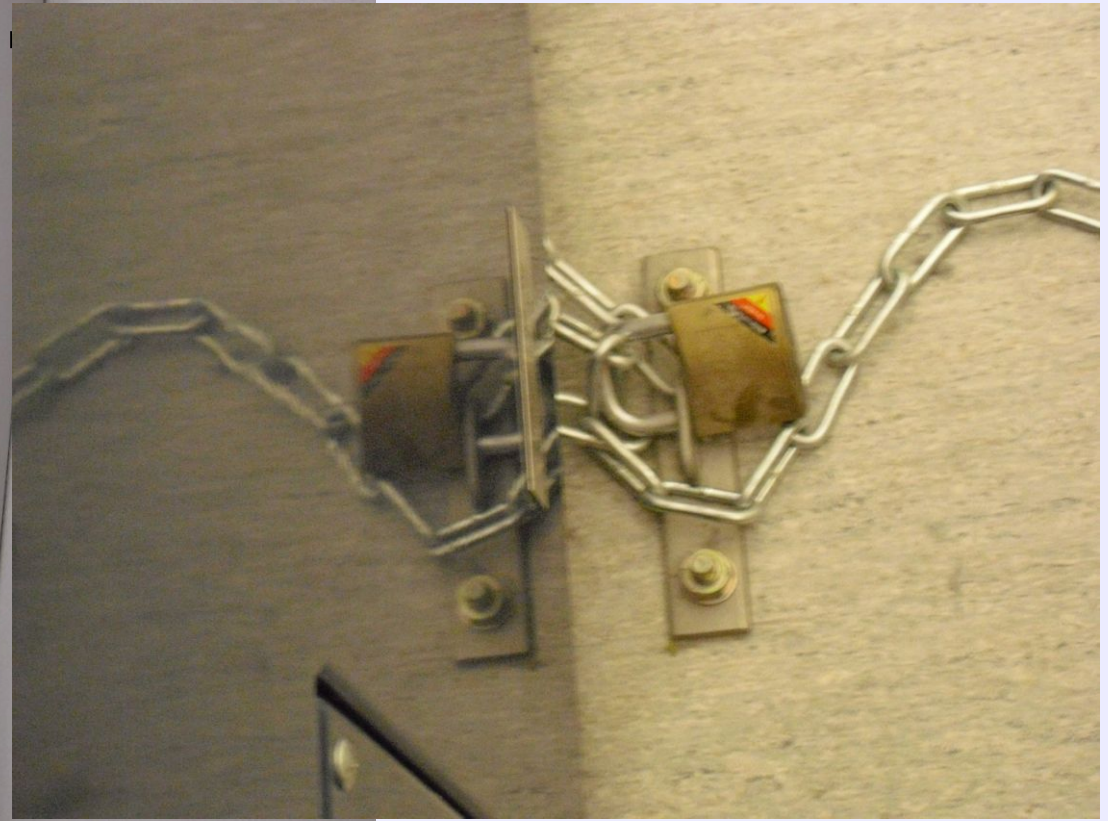
- Safes ....but...



## How to Provide Safety and Security in a Hospital?

### Safety Installations

- Chains .... but...



# How to Provide Safety and Security in a Hospital? Safety Installations

- **Bunkerdoors, surveillance, locks ....**





## Conclusion

- **We cannot provide absolute safety especially in planned criminal intend but we should try...**
- **We can prevent from “occasional” theft...**
- **Security should be an integral part of safety culture**

**We should discuss tools for optimization of security and safety**