

## Norway is phasing out gamma based blood irradiators

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Norway has decided to substitute or phase out gamma based blood irradiators with lower risk blood irradiators based on X-ray technology. Changing to X-ray technology is considered to be feasible and is also required by the national regulations. Acquisition of new gamma based blood irradiators is considered not to be justified.

### Background

Blood irradiators containing radioactive sources are according to the IAEA categorization system considered as category 1 sources. Due to security concerns The Norwegian Radiation Protection Authority (NRPA) has evaluated the feasibility of substituting or phasing out this type of blood irradiator located in hospital environments with almost risk-free blood irradiators based on X-ray technology.

### Legal basis

The two principles of substitution and justification are well implemented in the Norwegian Radiation Protection Regulation. Substitution from gamma sources to X-ray sources is required if the substitution is practically possible. Existing areas of use and methods shall be reconsidered when new information emerges relating to their justification.

The subject of substitution and justification was discussed with other Nordic countries in the forum of the Nordic Working Group on the Use of Sealed Sources (NORGIR), and we initiated an ERPAN survey to learn about other European countries experiences with blood irradiators.

### The ERPAN survey

Experience with X-ray based blood irradiators in other European countries was valuable input to our evaluation. We had three short questions for the ERPAN network:

#### *Questions*

- Do you have both types of blood irradiators in use?

- Can you indicate the number of X-ray based irradiators compared to gamma based irradiators in your country (any information is welcome)?
- What are the experiences with the X-ray technology, pros and cons (reliability, costs, maintenance etc.)?

#### *Answers*

The nine countries that answered were Spain, Slovenia, Sweden, France, Czech Republic, Belgium, Switzerland, Germany (Bavaria) and Luxemburg.

All the responding countries except one had gamma based blood irradiators and three countries had in addition X-ray based irradiators. One country indicated that they had started to substitute gamma based irradiators with X-ray a few years ago and that all gamma based irradiators will be replaced.

The total number of blood irradiators in the responding countries/states is estimated to be at least 104 gamma based and 19 X-ray based.

The impression from the feedback was that X-ray based irradiators work well, but there are some disadvantages. There are more breakdowns when installed in warm areas or rooms, the equipment needs maintenance which is expensive, and the system needs a continuous power supply which makes it essential to make sure the power supply and fuses can cope with the fluctuations that occur. It was also mentioned that X-ray based irradiators required longer time for irradiation.

#### **National experience**

Norway has 12 gamma based and two X-ray based blood irradiators. One of the hospitals has on their own initiative substituted a 189 TBq blood irradiator with an X-ray based irradiator. The hospital says that it was some technical issues after installation, but is functioning well now. They are in general satisfied with the machine and would have done the same substitution again.