

Statement on the justification of Full body-scanners using X-rays for security purposes

Body screening technologies, some of them using ionizing radiations, are now considered to be used for security checking, for example at airports. Having reviewed the report of HERCA working group 2, the Heads of European Radiological protection Competent Authorities address the five following recommendations to the European competent decision makers for security policies:

- 1) Different body screening technologies are available, principally :
 - X-ray Backscatter body-scanners, for which effective doses per scan to individuals are very low (generally about $0,1\mu\text{Sv}$ per scan). This technology is implemented to detect concealed objects beneath the human's clothing.
 - Body-scanners using non-ionizing radiation, such as millimetre wave technology, are equally available and are also used to detect concealed objects beneath clothing.
 - Transmission X-rays body-scanners can additionally image objects concealed within the body. Doses to the individuals per scan vary substantially dependant on the equipment used, but are currently significantly higher than backscatter technology (from $0.25\ \mu\text{Sv}$ per scan). Therefore, it would currently be very difficult to justify them for routine and systematic use.

Efficiency and efficacy of ionizing and non-ionizing technologies have to be assessed continually. Where it is considered to use X-ray body scanners for security purposes, then alternative imaging techniques that do not involve exposure to ionising radiation should also be explicitly examined. Benefits and health risks of both techniques should be assessed and compared. When both techniques achieve the predefined security goals with comparable efficiency and efficacy, the one with less health effects has to be preferred.

Regardless of the level of dose of ionizing radiation per scan to the concerned individuals (both operators and persons submitted to scans) and in accordance with the basic safety standards internationally applied in radiation protection, the three principles of justification, optimization and dose limitation must fully apply to the use of all human imaging technologies using ionizing radiation.

- 2) **Justification of exposures** is one of the basic principles of radiation protection. No use of radiation is permitted unless the benefits outweigh the disadvantages and in particular the possible radiation detriment :
 - A decision to implement human imaging using X-rays requires an evaluation of the expected benefits. In this case, benefits are expressed in terms of the improvement of level of security, which can only be evaluated by competent governmental agencies.
 - Such a security evaluation is specific to both the purpose and the environment within which the technology is being applied. Therefore a generic justification decision can not be made for use of body scanners using X-rays.

The use of X-ray body-scanners for security purposes thus needs a well considered and open process of justification by competent governmental authorities.

When X-ray body-scanners have been considered as justified for a given security purpose within a specified environment, the justification decision has to be reviewed on a regular basis, as technologies, on the one hand, and threat evaluations, on the other hand, constantly change.

- 3) **The optimization process should be given careful consideration:**
 - Radiation doses to persons submitted to scans and operators depend on the type of security scanning equipment and maintenance standards as well as operational procedures (Eg. systematic scanning / selection of passengers, crew, airport workers, multiple scans etc.);
 - Operators should be educated and trained so that they are able to take care of their own radiation protection as well as that of the persons submitted to the screening, both in normal operating conditions and in the event of incidents or accidents;
 - Occupational exposure has to be assessed and documented;
 - Incidental scenarios have to be documented, procedures need to be available and events have to be recorded, analysed and reported according to rules set out by the competent national authorities;
 - Equipment should conform to a technical equipment specification and quality assurance standard that includes the prevention of accidental exposure, the optimisation of the scanning parameters and image processing, and the methods to test the performance and safety of the device. IEC 62463 (ed. 1 – 2010) could serve as a basis.
- 4) **The dose limitation principle should be respected:** operators must be able to demonstrate to the relevant competent authority that annual doses to the workers and to the public are below the respective statutory annual dose limits;
- 5) Where it is considered that the use of X-Ray body scanners for security purposes is considered as justified, **information should be delivered to individuals before scanning and to workers on these techniques and their possible impact on health and on the benefit related to the security purpose.** Where appropriate, and particularly in case of routine use of X-ray bodyscanners, Regulatory authorities and operators may consider provision of alternative screening methods¹ - that do not imply exposure to ionizing radiation but offer similar security guarantees - for individuals who so desire either for themselves and/or for the persons under their care and responsibility.

National security policies do not only apply to national citizens, in particular at airports. Consequently, the Heads of European Radiological protection Competent Authorities consider that a common approach for decision making on the use of X-rays body-scanners is highly desirable in Europe.

European and IAEA Basic Safety Standards, both currently under revision, cover human exposures for non-medical purpose. Use of human imaging for security purposes should be explicitly addressed in both standards and it is recommended to draft European and IAEA Basic Safety Standards in a consonant way and consistent with the 5 recommendations above.

¹ *Alternative screening methods are defined as other techniques or screening procedures (pat down etc.) offering similar security benefits.*