ETHICAL QUESTIONS RELATED TO THE USE OF RADIATION IN SECURITY CONTROL

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NEEDS FOR RESEARCH

With the ever increasing globalization, there is certainly a need to find common ground in terms of security control, because it affects people from many different backgrounds.

OBJECTIVES OF THE RESEARCH:

- Overview of the use of **radiation** for purposes of **security control**
- Description of two **different types** of equipment (backscatter X-ray/ millimeter wave)
- Assessment of benefits of **increased security** versus related **suspected health risks**
- Necessity of **informed consent**
- **Ethical questions arising** in this context, traditional and new frameworks of reference
- For discusion it is also to consider **alternative sources** of screening for security purposes, especially during power outage, device break down or in case of any morality conflicts

WHAT DOES MORALITY MEAN IN THE CURRENT WORLD?

HOW DO WE DEAL WITH ASSUMED BENEFITS AND HEALTH RISKS WHEN THERE IS NOT ENOUGH EVIDENCE?

Ethics and morality will perhaps have a different meaning for a citizen of Mexico, Japan, Zambiaor the Netherlands. It may be different for Eastern and Western cultures.

!!! Finding some UNIFYING PATTERN is crucial for developing a suitable system of RADIOLOGICAL PROTECTION !!!

ICRP (International Commission of Radiological Protection)

Recently, efforts have been made to **clarify the ethical basis** of the international system of radiological protection, on which much of the national regulation is based.

BUT - to what extent are the underlying moral standards and values universal, or perhaps differ from country to country??

- Recommendations do NOT ALWAYS explicitly refer to ethical values.
- Discussion until recently based on moral standards of **western cultures**
- Roughly 78 % of world population is, however, NOT influenced by western philosophies!! (Czech Ministry of Interior, 2018)

Applied ethics:

While *medical ethics* addresses questions of medical screening and possible side-effects, little attention has been given to **ethical questions in regards to security controls.**

- Public places such as hospitals, stadiums, nuclear power plants, and airports all use some kind of screening procedure and radiation for protection.

- Protection of our health is at the center of attention in hospitals, the protection of our safety in the latter cases.

Different kinds of radiation are employed for purposes of security control at airports and other facilities which are thought to be vulnerable to criminal activities.

- Full-body scanners use either **backscatter X-ray** or **millimeter waves** to detect weapons or smuggled goods.

One important issue is the proper balance between the **health risks** for those exposed and the **benefit of increased security** for the public, another is the necessity of **informed consent** for everybody affected, to name just two examples.

Backscatter X-ray:

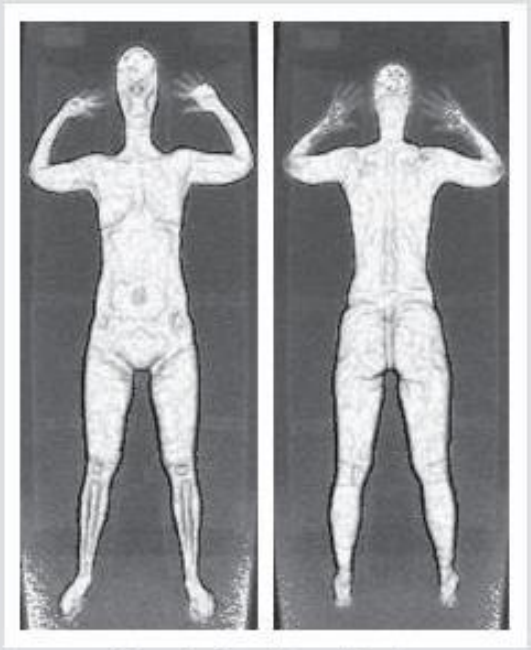
„ NAKED SCANNER “

- First whole body scanner introduced in 1992 (luggages)
- Widespread use since 2001 (terrorist attacks)
- **Banned by the EU** in 2012 (what about other countries?)

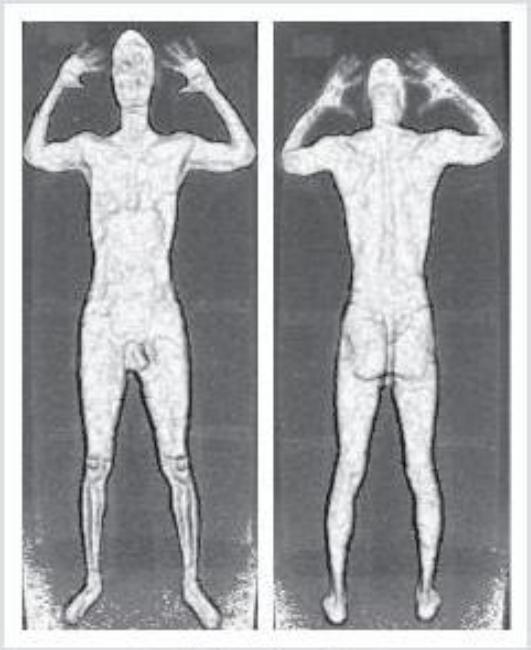
Backscatter technology is based on the Compton scattering effect of X-rays, a form of ionizing radiation that can break chemical bonds. Ionizing radiation is **considered carcinogenic** even in very small doses. However,

- 50 backscatter scans are roughly equivalent to the exposure of one dental x-ray (Archives of Internal Medicine, 2011).

- only creates a 2D image



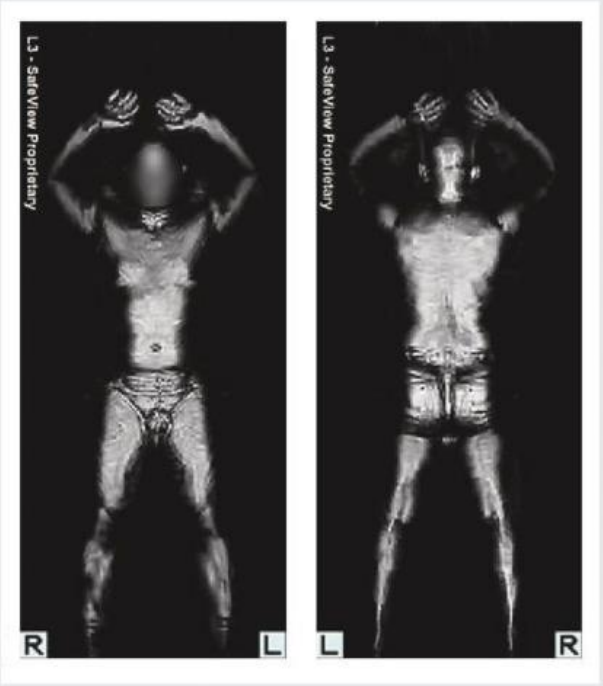
Female Front and Back



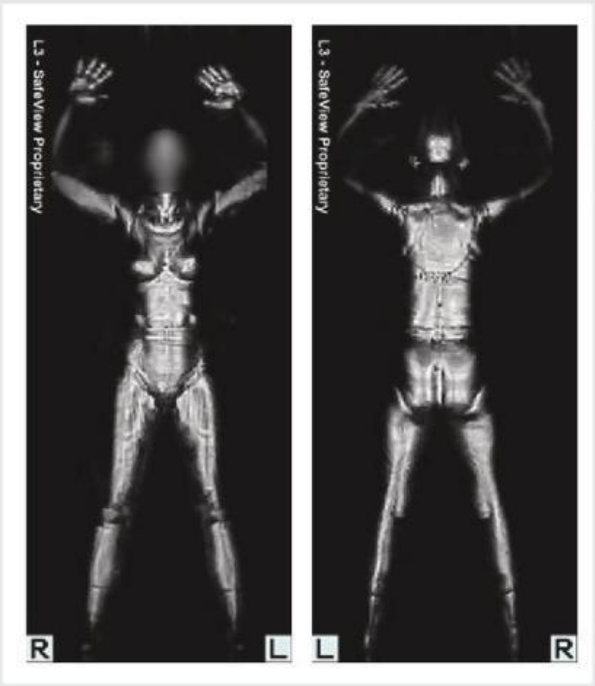
Male Front and Back

Millimeter wave detection:

- A whole-body imaging device used for detecting objects concealed underneath a person's clothing using a form of **electromagnetic radiation (cell phones, microwave)**
- No evidence of **long-term detrimental health effects** from chronic exposure to non-ionizing radiation **-** but **doubts have been raised about the absence of risk** from regular exposures
- Used for loss prevention, prevention of smuggling and screening at government buildings and airport security checkpoints.
- 3D images



Male Front and Back



Female Front and Back

History of security screening:

- 1960-1970 - nearly 400 aircraft hijacking attempts
- 1976 - **Air Cuba Flight**, brought down by bombs
- September 11/2001, terrorist attack in **New York City –** leading to mandatory screening and stricter security
- December, 2001 **shoe bomber –** led to forcing passengers to take off their shoes and submitting them to X-ray screening.
- 2009, the infamous **underwear bomber –** leading to liquids and explosives prohibitions aboard

Benefits of increased security:

…all the terrorist‘s attacks and hijacking attempts have led to improved public security:

- **Higher** public security!
- **High detection** capability to identify hidden objects (not explosives)
- **Quick** and more **comfortable** (no touching)

Health risks:

Not enough long-term data to determine risks:

- **Adverse effects possible** especially in **vulnerable populations** (pregnant, elderly, predisposed to gene mutation- impaired ability to repair their DNA cells when exposed to X-ray)

- **Any dose produces potential health risk** (Policy Report, 2010)

- Mechanical damage **could lead to abnormally high dose** of emitted X-ray beams (Stoller, 2010)

Assessment of benefits of increased security versus related suspected health risks

- use of the full-body benefits primarily the society rather than the exposed individual

- Although the doses per scan are well below the public dose limit (**nano- to microsievert**), this does not remove the requirement for justification (also let‘s consider workers, technicians, frequent flyers, pregnant, elderly, etc.)

- What is mostly considered here is the **ratio** between radiation-related individual health problems vs security threats to the public

- The risk-benefit ratio should be considered in the justification prior to a practice being introduced but this may also need to be revisited when new technologies or new information become available.

Informed consent:

The full-body scanners reveal sensitive personal information (body parts, implants, trans-gender, body distortion…)

→ thus the collecting and processing of personal data should be justified, explicit and people **should be informed about**:

- ❑ the purpose of body scanners
- ❑ the benefits of using body scanners
- ❑ the possible health risks associated with use of body scanners
- ❑ the data storage info
- ❑ the alternatives if one refuses to be scanned

(at check-in, airline/airport website,…)

Task Group 94

Established in 2013 by ICRP

Objectives:

„To identify the ethical values associated with the system of radiological protection for occupational, public and medical exposures, and for the protection of environment (Cho, K-W. et al, 2018)“.

- Cooperation with specialist around the world

Ethical back-up for the three principles of radiological protection during planned, existing and emergency situations:

- *Optimisation (exposure as low as possible)*
- *Justification (weighing of all pros and cons)*
- *Limitation (maintaining dosage at tolerable level)*

Traditional framework:

Beauchamp and Childress (1979)

Beneficence (promote good)
Non-maleficence (do no harm)
Justice (act fairly, treat everyone the same way)
Autonomy (rights to make own informed decisions)

- Rooted in *common morality of the Western World*, not taking account of culture or religion (Zölzer, 2013)

- *Written and oral traditions* could be a solution to unify the western and eastern cultures (Holy scriptures, Aristotles, Confucian,…)

Discussion:

ANY QUESTIONS??

WHAT IF…?

Are we prepared for a power outage and technical failures?

- ***Mechanical damage*** **-** abnormally high dose of X-ray could be emitted (once developed, very short period for pilot testing and evaluation - deployed at airports almost immediately)
- ***Power shut down*** (for hours) - how do we proceed with scanning and security at aiport?

Security threats

- Ineffective ?? Gaps??
- Scanners cannot detect explosives and objects in orifices.

Moral conflicts

- E.g. Muslims- prohibited by Quran to reveal bodily parts to strangers

Alternatives??

- Israeli airport example- thorough passenger profiling (interviewing passengers by highly skilled professional)
- Bomb sniffing dogs, chemical-based scanners
- Secondary screening „pat downs“ (embarassing)

Conclusion and primary goals:

- Enforce **informed consent**
- Perform an ongoing **analysis of the security gaps, but also the health risks**
- **Implement enhanced and less invasive** screening methods / **alternative** methods (profiling)
- Discuss how **individual risks** can be compared to **public benefit**
- Develop a **framework** that takes into consideration/ encompasses **all cultures** and different **backgrounds**

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THANK YOU FOR YOUR ATTENTION!

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