Developing a CompRadRisk (CRRis) NATO App for improved risk communication of radiation exposures – actual status –

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NATO STO

The Human Factors and Medicine (HFM) Panel of the NATO Science and Technology Organization (STO) provides the science and technology base for optimizing health, human protection, well being and performance of the human in operational environments with consideration of affordability. This is accomplished by exchange of information, collaborative experiments and shared field trials.

Starting in the early nineties several STO HFM research task Groups (RTG), workshops and symposia were focusing on "Ionizing Radiation Bioeffects". STO HFM 291 RTG was predecessed by HFM 222 RTG; their report was published in April 2018 (see also www.sto.nato,int). By implementing HFM 291 RTG the research in this field will be continued.

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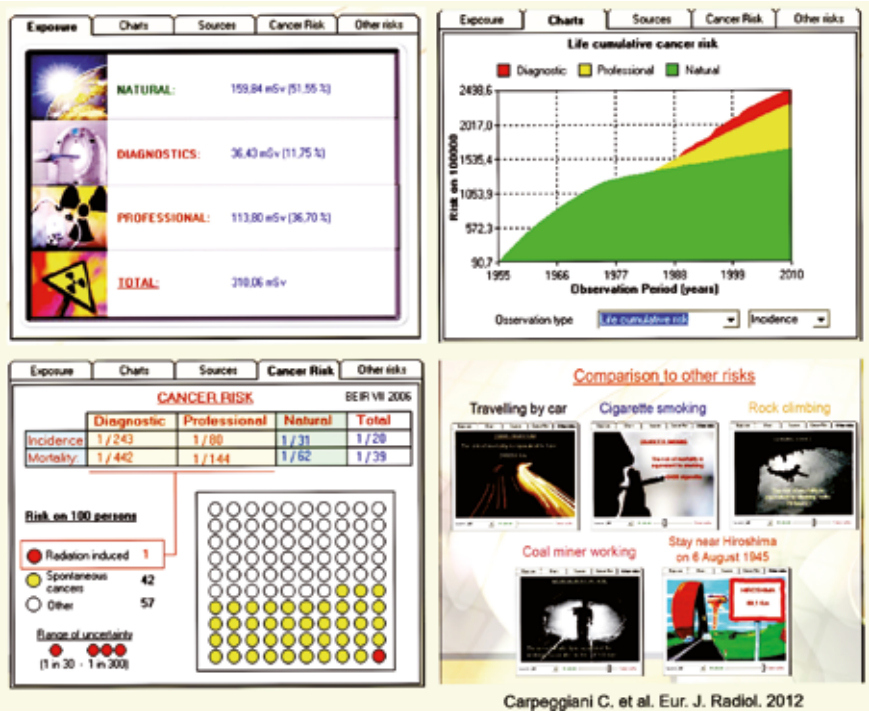
The Group

The NATO STO HFM 291 RTG on "Ionizing Radiation Bioeffects and Countermeasures" represents a group of scientist from military and civilian academic and scientific institutions working in the field of radiobiology. Among other tasks, the RTG intends to extend their work on risk estimation and communication **to bridge the gap in appropriate judgement of radiation exposure health risks**. The group has no explicit psychological background, but an expertise in radiobiology and risk assessment.

The task (general)

The group believes that as one of the essential first steps in risk communication it is **required to put radiation risk into perspective. The group does not intend to provide risk estimates based on radiation exposures**. Radiation risk requires a weight in comparison to already known risks. What we envision is to convert/Compare Radiation exposure Risks **(CompRadRisk, CRRis, NATO App)** with daily life risks such as cigarette smoking, driving a car, etc.



Carpeggiani C. et al. Eur. J. Radiol. 2012

Fig. 1: Screenshots of the so called "RadioRisk" software.

Fig. 2: Screenshots of the so called "X-RayRisk" © angiocalc LLC software (www.xrayrisk.com)

CRRis – a draft

What is it for (purpose)?

CRRis ...
- ... is a first step to communicate radiation risk,
- ... converts dose into daily life risk equivalent (e.g. driving car, smoking),
- ... focuses primarily on LLR, but also looks at high doses (ARS), and
- ... works as an interface to "Citizen Science.

CRRis customers will be
- soldiers after occupational radiation exposure,
- military decision makers,
- all patients after medical diagnostic/therapeutic exposures, and
- civilians living in contaminated areas.

What is it <u>not</u> for?

CRRis will ...
- ... provide no dose estimation,
- ... not estimate tumor risk estimation, and
- ... not convert a scenario into a dose estimate.

What is already „on the market": the highlights in short

RadioRisk Software ...
... provides a cumulative exposure comparisons from different sources, quantifies lifetime extra cancer risk and compares exposure estimates to other risks based on up-to-date guidelines (BEIR VII) and peer-reviewed research. However, risk equivalency examples are sometimes questionable from a practical point of view and user must have a known pre-recorded value for their historical exposure, or a personal dosimeter (see Figure 1).

X-RayRisk ...
... allows users to track their imaging history and estimate their personal cancer risk based on BEIR VII, 2006. Additional comparison to other exposure groups (pilots) and risk of death from other sources such as driving are provided as a list, but a conversion of radiation exposure into these other sources of risk is not provided (see Figure 2).

RadRat ...
... represents a radiation risk assessment tool for lifetime cancer risk projection. Uses organ-specific dose estimates according to age at exposure and sex. Reported lifetime risks are based on risk models from the 2006 report of the National Academies of Sciences' BEIR VII Committee and models developed by the NCI.

Other approaches ...
... to summarize and document exposures are also on the market (e.g. DoseMonitorTM, http://www.dosemonitor.com/, 2010; RadiationPassport, http://www.tidalpool.ca/radiationpassport/ 2018; GammaPix: Gamma Radiation Detector, http://gammapix.com; RadioactivityCounter, www.hotray-info.de/html/radioa_ios.html.

The next step will be to ....

... develop a draft CRRis following the features shown above and improving mitigation, ease-of-comparison features ("closer to home" and graphical presentations) as well as using easy understandable and clear phrases.

Manuscript data

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