

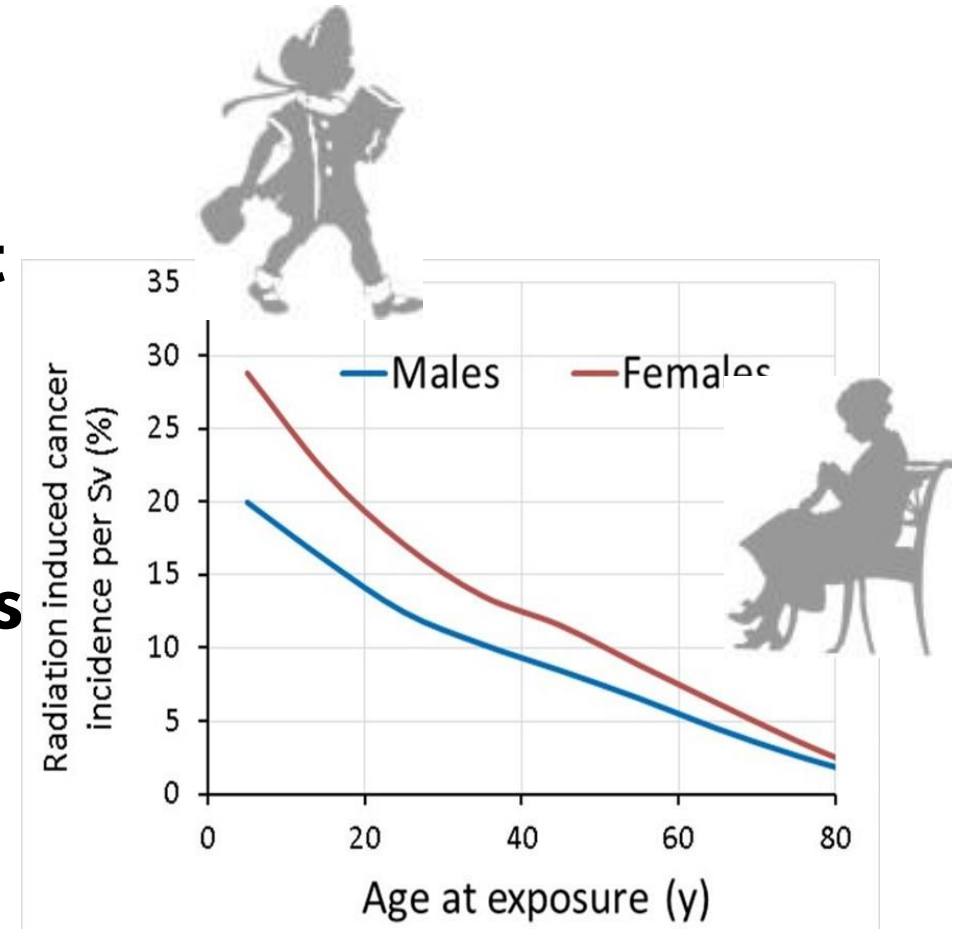
# TG108 Workshop: Optimisation of Radiological Protection in Digital Radiology Techniques for Medical Imaging

## Section 5: Consideration for Paediatric Patients (and Their Families)



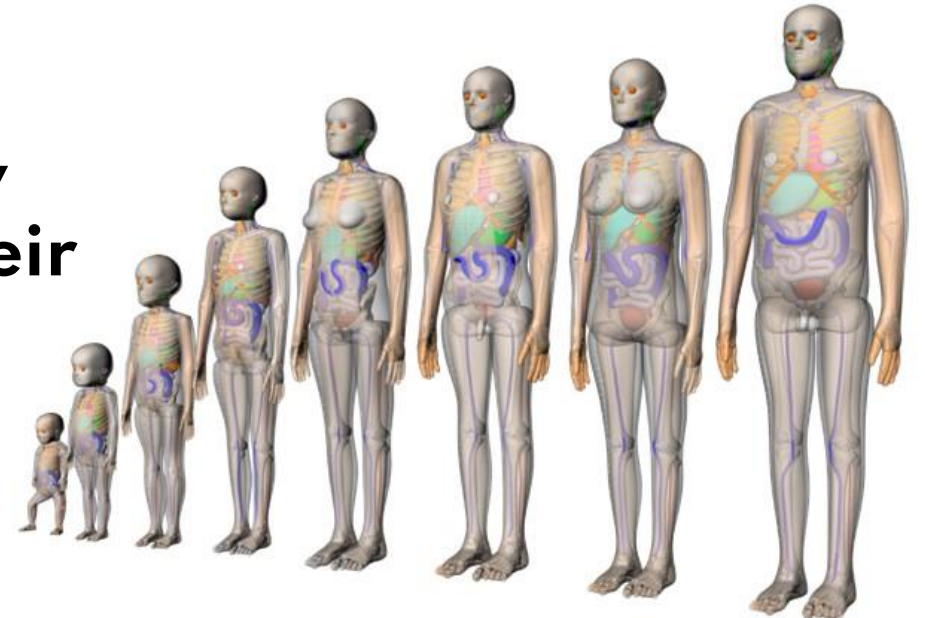
# Sensitivity to radiation

- Children are in general more radiosensitive than the average adult
- The cells in many of their organs are more sensitive to radiation damage
- They have a longer lifetime to manifest any radiation health effects
- Keeping doses low is especially important



# Children come in a wide range of sizes

- Children come in a wide range of sizes
- Selecting exposure factors is more difficult because of the range in size and extra care is needed
- Patient age is a poor predictor of body thickness and weight is generally preferable for assessing exposure requirements.
- The boundary definition based on the individual scan indication is particularly important for paediatric patients, as their organs are in closer proximity.
- Collimation is critical.



# Why children “Are not small adults” ...

- **Childrens understanding and responses to different situations vary, as well as their behaviour.**
- **Staff carrying out paediatric exposures must understand the ability of the patient to cooperate, as well as the influence of size on the exposure.**



# Children “Are not small adults” ...

- **Childrens’ physiology and diseases that we image differ at different ages. E.g., cancers are typically large sarcomas unlike adult carcinomas**
- **Staff must know what alternative examinations are available for different clinical indications, especially techniques not involving ionising radiations that are available locally.**

# Particular technical factors

## Radiography and fluoroscopy

- A grid is usually unnecessary for infants and children under the age of 4 years.
- Addition of copper filtration removes lower energy photons
- Selection of pulsed fluoroscopy on the lowest possible settings when possible
- Use dose reduction methods when available, including virtual collimation and last image hold.
- **Develop paediatric specific protocols for common condition for all modalities**

# Paediatric considerations in CT

- **Patient size specific protocols are particularly important for CT because of the higher dose levels**
- **Protocol optimisation requires an understanding of clinical indications, patient sizes, and the ability of patients to cooperate...**
- **When planning a CT scan of a child:**
  - **Have you considered alternative imaging such as ultrasound or MRI?**
  - **Scan only the indicated area of the body (do not over-range).**

# Protocol Optimisation for Children: growing number of resources on open web sites

The Message:  
Simple, direct,  
clear, resonant



- Image Gently protocols for digital radiography: 'Back to Basics'
- Fluoroscopy, CT, and interventional procedures for paediatric exposures



# Important differences from adult digital optimisation

## Image Gently: Radiation protection for children

Knowledge must be layered



## The need for specific education

- The core team of radiological professionals must have specific education and training in optimisation techniques for imaging infants and children.
- Referring clinicians, parents, carers and children must be given sufficient understanding of the process
- This might be through use of information leaflets and web aids, to allow them to be involved in the decision-making process.

# Important Differences from Adult Digital Optimisation



- Shared decision making applies from the time when imaging is being considered, through performance of the examination, the diagnosis, and decisions about management of the patient.
- Include all stakeholders in the justification, paediatric care and communication
- Whenever possible have trained personnel
- Adapt protocols for unique circumstances

# Paediatric Radiology Key Messages

- **The core team must have adequate education and training in optimisation of imaging for infants and children.**
- **Use of patient weight (as a proxy for patient thickness) rather than age is a better way to develop digital radiology protocols.**
- **Use dose reduction methods when practicable with fluoroscopy**
- **Virtual collimation, removal of the grid, pulsed fluoroscopy on the lowest possible setting, additional copper filtration, last image hold**
- **Develop paediatric specific protocols for common conditions for all modalities. Pay particular attention to CT.**

# ICRP

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