

# Ask EuroSafe Imaging Tips & Tricks

## Paediatric Working Group

# My child will have a CT scan! A guide for parents

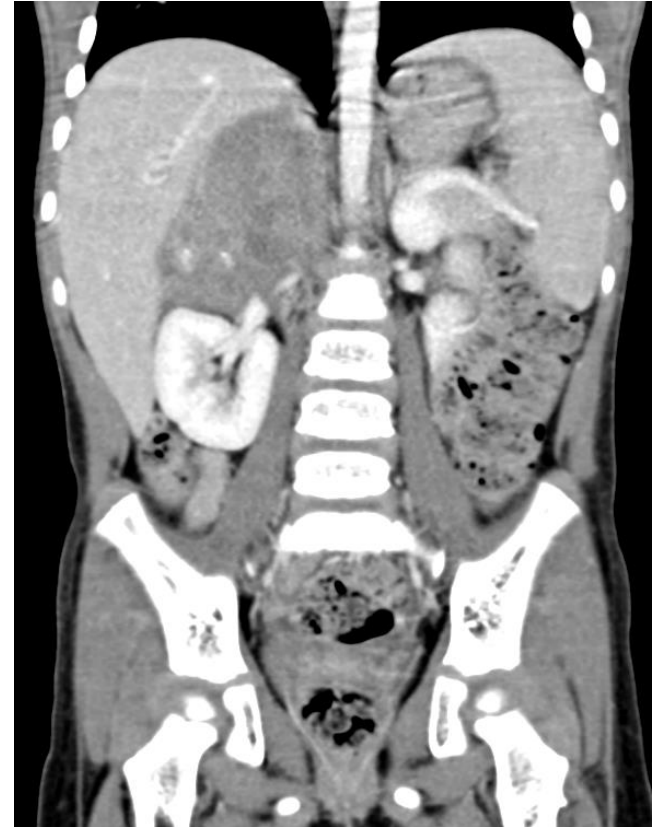
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# What is a Computed Tomography (CT) scan?

- A Computed Tomography (CT) scan is a fast way to get very detailed images of the inside of the body
- CT images are more detailed than plain X-rays (producing just one picture at a time) as they are taken from lots of different angles during the same scan



## Why is it needed?

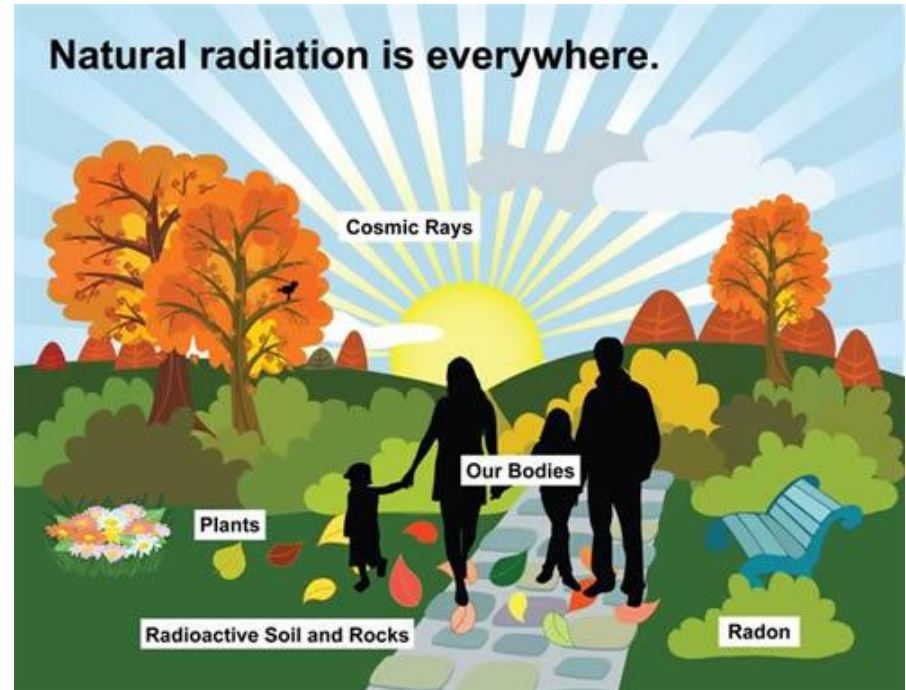
- CT scans can help doctors diagnose a wide range of medical conditions as they provide very detailed information
- CT can be useful in many circumstances, including detailed assessment of head, chest and abdomen injuries after trauma or for infections, birth malformations, urinary stones, cancer and for other conditions
- CT findings can help doctors in reaching a correct diagnosis and can allow an appropriate course of treatment to be started

## CT scans use X-rays, which carry risks...

- CT scans use low-level radiation. The risk of developing cancer from low-level radiation is modelled on the basis that:
  - the risk of cancer increases with the dose of X-rays used and there is no threshold value below which the risk is zero
- However, it is still unknown if this model is correct, therefore:
  - in the absence of certainty, it should be ensured that the X-ray dose used in a CT study does not exceed the minimum amount necessary to ensure optimal diagnostic quality

# How much is the dose of X-rays in CT?

- All of us are exposed to natural background radiation, originating from soil, rocks, and outer space: this background radiation is always there
- A rough estimate can be done comparing the dose from a CT study with the dose from the natural background radiation



from Canadian Nuclear Safety Commission

# Typical effective doses for CT studies in a 5-year old child and its equivalence in terms of exposure to natural background radiation

Examination	Effective Dose (mSv*)	Equivalent Exposure Time to Background Radiation
Chest X-ray	0.02	2 days
CT Head	2	10 months
CT Chest	3	1.2 years
CT Abdomen	3.7	1.5 years

\* mSv or milli Sievert is a unit of radiation dose used in radiology.

Adapted from: Communicating radiation risks in paediatric imaging, WHO, 2016

## So... what is the risk of developing cancer from a CT study?

- For the general population, the overall risk of developing cancer during their lifetime is about 42%
- According to the best model (see page 4), a CT scan may add a further *theoretical* risk ranging from 0.05% to 0.15%:
  - in other words, the risk of developing cancer from a CT study is very low
- The value of a justified CT scan always outweighs an increased risk of developing cancer from the CT scan

Johnson JN et al (2014) Circulation 130:161-167

# “Justified CT scan”... what does it mean?



- A CT scan – or any other diagnostic imaging procedure - is justified if it can provide the benefits of a prompt diagnosis and adequate treatment: these benefits always outweigh any associated risk such as a small additional risk of cancer due to the exposure to radiation



# Justification and guidelines

- Authoritative bodies and professional societies have issued a series of recommendations and guidelines concerning the justification of radiological examinations in children according to the clinical indications
- Referring physicians and radiologists have to comply with these guidelines

## I have heard of “optimisation” of diagnostic imaging studies... What does it mean?

- Optimisation means to reduce as much as possible the dose of X-rays in a radiological study without compromising its diagnostic capability
- To address this concern, several guidelines and recommendations for optimisation of imaging studies in children - CT included - have been issued by authoritative bodies and professional societies
- Optimised CT studies, based on the patient’s size and clinical indications for the study, should always be used by the radiologists and radiographers in charge

## What does a CT scanner look like?

- A CT scanner looks like a giant futuristic donut standing on its side or like a large washing machine with a hole in the middle
- A X-ray bed slides in and out of the hole
- Around the hole, hidden from the eye, there are a X-ray tube and detectors, on opposite sides to each other



## What does a CT scanner look like?

- The computers that control the CT scanner and allow the staff to view the images are in a room next door
- The CT scanner is operated by a radiographer, who sits in this room and is always able to see the child during the scan



## How is a CT scan taken?

- Parents/guardians can stay beside their child during the scan as long as they are wearing lead rubber aprons; these heavy aprons will protect them from the radiation
- Your child will lay down on the CT examination table and will have to stay still. If they can't lay still for the length of the scan, some type of sedation may be necessary
- Sometimes, a contrast medium is injected in order to see internal organs better. If this is required, an intravenous line will be placed in their arm before the start of the CT scan
- The radiographer will be able to see, hear and speak to the parents/guardians and the child during the CT scan

## What will it feel like?

- The preparation for the exam (intra venous line placement, positioning, sedation if necessary) can require up to 30 minutes
- The actual taking of the CT images can last from less than one minute to a few minutes
- The CT scanner is very quiet while it takes the images and the whole procedure is painless, although there may be some discomfort if an intra venous line has to be placed
- If contrast medium has to be injected, the child may experience a flushed sensation and a metallic taste in his/her mouth

## Can anything go wrong?

- Some patients can have an allergic reaction after the injection of contrast medium although this is very rare
- In most cases, they are mild (itching, redness). Very rarely, they can be severe (difficulty breathing)
- If these reactions occur, they will appear shortly after the examination: all the staff in the radiology department are trained and know what to do in case any reaction happens

## The CT scan is over: now what?

- The radiologist who is in charge of reading the images will review and interpret all the different images made
- The radiologist will then prepare a report on what he/she has seen. This report will be added to the images and will be made available to you and the referring doctor for further action, e.g. treatment
- Sometimes a further follow up examination could be required. Either the radiologist or your doctor will explain exactly why the follow up test is required