

Radiation & You

WHAT IS RADIATION?

Radiation is energy.

It is all around us for every minute of every day. We are exposed to radiation in many ways.

The sun exposes us to cosmic radiation.

Flying in a plane increases our exposure to radiation from the sun as we have less protection from the earth's atmosphere.

Your radiation exposure on a return flight from Dublin to New York is the same as the exposure from having two or three chest x-rays.



Radiation, in the form of radioactivity, is found in many foods. For example, bananas contain small amounts of a radioactive substance called Potassium-40.

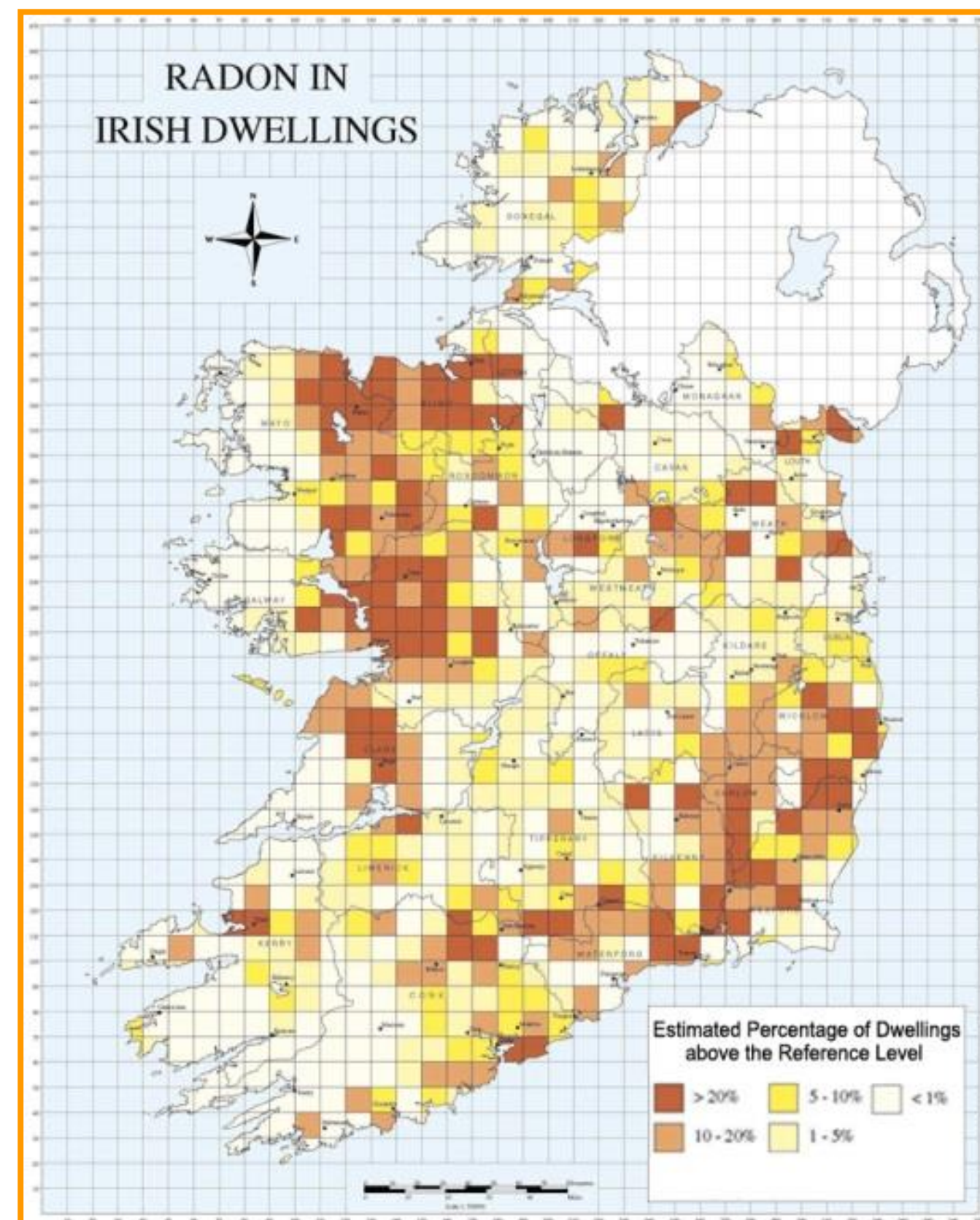
This means that **YOU** are very slightly radioactive at all times!!

In Ireland, most of our radiation exposure comes from breathing Radon gas, which is present in the air all around us.

Depending on where you live, your exposure to Radon gas can go up or down (see the radon concentration map on the right).

These forms of radiation (the sun, food, Radon) are collectively termed "Background Radiation". On average, people living in Ireland are exposed to **4mSv** of background radiation per year [1].

mSv is shorthand for *milliSievert* which is how we measure radiation exposure.



HOW DO WE USE RADIATION IN MEDICINE?

Radiation is a very useful tool in medicine. It is usually used in the form of **X-RAYS** or, in Nuclear Medicine, **GAMMA RAYS**.

Both allow us to see inside the human body. Both can help doctors assess injuries and diseases in a quick and easy manner.



There are **FIVE** ways that radiation is used in our hospital

GENERAL RADIOGRAPHY

Most of our patients have this type of imaging. These are typically images of our bones (e.g. hand or foot).



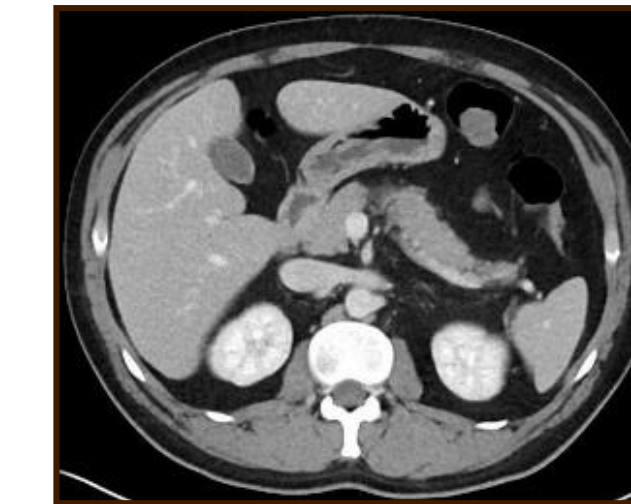
FLUOROSCOPY

This type of imaging allows us to see motion in the human body e.g. the passage of food from our mouth to our stomach. We also use it in the operating theatre to help visualise the skeleton or broken bones.



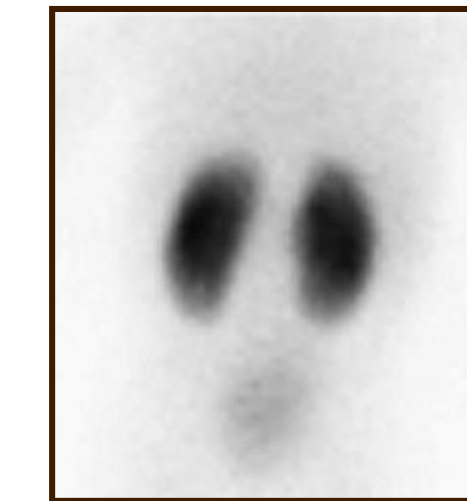
COMPUTED TOMOGRAPHY (CT)

This type of imaging is reserved for when the doctor requires a more detailed picture of organs in the body.



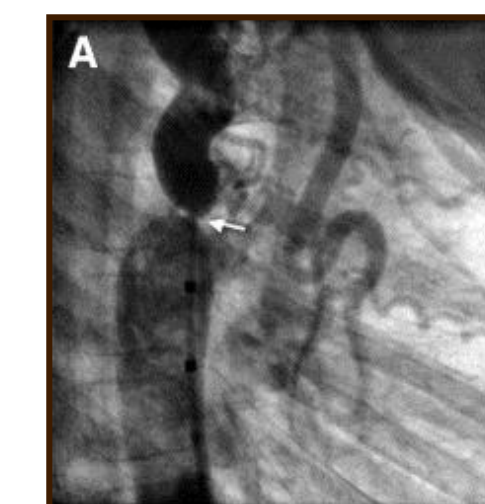
NUCLEAR MEDICINE

This type of imaging is most frequently used to examine the function of different organs in the body (e.g. how well our kidneys are working).



CARDIAC CATHETERISATION

This type of imaging is a form of fluoroscopy performed in patients with heart problems.



ARE THERE ANY RISKS ASSOCIATED WITH X-RAYS?

It is known that exposure to very high levels of radiation can cause cancer.

However, it is unknown for certain, if there is any risk associated with exposure to x-rays in Radiology departments. If a risk exists at all, it is very low.

Consequently, we always strive to use the smallest number of x-rays to acquire an image that can answer your doctor's question.

It is important to understand that the risk of **NOT** having the x-ray exam may be much greater than the small risk associated with the procedure itself. In other words, **the benefit associated with the x-ray exam exceeds the small risk.**

WHAT IS THE RISK ASSOCIATED WITH MY CHILD'S X-RAY EXAM?

Approximately 42 in 100 people will develop cancer sometime in their lives (this is termed the "Natural" risk) [2].

The table below shows the estimated increase in this risk for a variety of x-ray examinations (taken from reference [2]).

The Natural Risk of Cancer is	The Natural Risk increases to	For a patient having a
42 in 100 people	42.36 in 100	Cardiac Catheterisation Intervention
42 in 100 people	42.15 in 100	Chest Examination (CT)
42 in 100 people	42.15 in 100	Bone Scan (Nuclear Medicine)
42 in 100 people	42.06 in 100	Head Examination (CT)
42 in 100 people	42.05 in 100	DMSA Scan (Nuclear Medicine)
42 in 100 people	42.05 in 100	Barium Swallow (Fluoroscopy)
42 in 100 people	42.04 in 100	Tube Placement (Fluoroscopy)
42 in 100 people	42.00 in 100	Chest X-ray (General Radiography)

FREQUENTLY ASKED QUESTIONS (FAQ): The table below details the answers to some of the more common questions parents and guardians have about their children's x-ray exposure.

Question	Answer
Are there any risks associated with my child's x-ray examination?	It is well known that exposure to high levels of radiation (greater than 100mSv) is associated with an increased risk of getting cancer. However, for exposures below this value, no link with cancer induction has ever been conclusively demonstrated. Many of the examinations undertaken in a Radiology department result in a dose of radiation much less than 1mSv, with the majority of exams measuring less than 10mSv.
What are the benefits of having an x-ray examination?	Many diseases can only be diagnosed by an x-ray examination (e.g. pneumonia). In some cases, the development of more complex examinations and treatments using x-ray, such as cardiac catheterisation, have radically improved the quality of life and life expectancy of thousands of children (e.g. those born with life threatening heart conditions). Your doctor will only refer your child for an x-ray examination when they believe that the benefit of having the exam outweighs the small potential risk. This practice of weighing the benefit against the risk applies to all aspects of medicine and extends to all aspects of your child's care.
Where can I find more detailed information about radiation exposures in medicine?	Both the "Image Gently" and "Health Physics" websites answer many of the questions parents have about their child's radiation exposure. They can be accessed at - http://www.imagegently.org/ and www.hps.org/publicinformation/ate/



References

1. *Radiation Doses Received by the Irish Population*, Radiological Protection Institute of Ireland, 2014 (RPII 14/02).
2. *Communicating Radiation Risk in Paediatric Imaging*, World Health Organisation, 2016.