THE EFFECTS OF RADON ON HUMAN HEALTH
WHAT IS RADON?

- Natural radioactive gas without colour, smell or taste
- Product of uranium decay
RADON PRODUCTION

For Radon $T_{1/2} = 3.8$ days

HEALTH EFFECTS OF RADON
RADON & LUNG DAMAGE

HEALTH EFFECTS OF RADON
WHERE DO WE FIND RADON?

EVERYWHERE

Granite soil

High concentration
WHY RADON GOES INSIDE HOUSES?

It’s physics!!!

Buildings are at a lower pressure than the surrounding air & soil.

Radon & other soil gases are drawn into the building.

When air is exhausted, outside air enters the building to replace it. Much of the replacement air comes from the underlying soil.
HOW RADON IS MEASURED?

Radioactivity ➔ Becquerel (Bq)

1 Bq = 1 nucleus decay per second
For Radon, we measure the amount of radioactivity in air volume for a specific amount of time!

So...

how many Bq in a cubic metre of air m³?!
For how long?!

Radon exposure: $\frac{\rho_{\text{tracks}}}{C_f}$
(Bq * h / m³)

Radon concentration: exposure / exposition time
(Bq / m³)

HEALTH EFFECTS OF RADON
RADON CONCENTRATION FACTORS

The amount of radon changes:
- During the day
- Between summer and winter
- With the air temperature

More Radon:
- Winter
- Night
RADON LEVELS AROUND THE WORLD

Health Effects of Radon
Exposure to radon:
- 95% from indoor air
- 1% from drinking water sources

Most of this 1% is from inhalation of radon gas released from running water activities, such as bathing, showering and cleaning.

Only 0.1% is from swallowing water contaminated with radon gas.
HEALTH EFFECTS OF RADON

- Increases the probability of lung cancer
  - x 10 times for smokers
- Stomach cancer
- Liver cancer
- Skin cancer
- Leukemia

NO SMOKING
PROBABILITIES OF CANCER

Probability of cancer occurred depends on:
- How much one is exposed?
- For how long is exposed?

The more one is exposed

The higher the probabilities
Scientists estimate that 15,000 to 20,000 lung cancer deaths in the US are related to radon.

10% of radon-related cancer deaths occur among non-smokers.
RADON DETECTION

Measurements are performed with detectors which are left in the house for periods from days to months.

- Different measurement for every house
- Many detectors in different rooms

The levels are different for every country. The reference level should not exceed 300 Bq/m$^3$. Radon in public drinking water supplies should not exceed 100 Bq/l.

Public buildings & offices: 500 Bq/m$^3$
Schools: 400 Bq/m$^3$
SOLUTIONS FOR RADON REDUCTION

Improve ventilation
Sealing floors, walls & cracks
Underfloor ventilation
Install a radon sump system
THANK YOU
REFERENCE

- www.certi.info
- www.who.int
- www.cancer.gov
- www.radon.com
- www.ukradon.org
- www.sosradon.org
- www.epa.gov
- www.miam.it
- www.radon.it
- www.ispesl.it
- www.eeaе.gr