Health Risks due to exposure to radon in homes in Ireland

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Structure of Presentation

- Properties and history of radon and its hazards
- Review the most recent epidemiological study on exposure to radon in homes
- Review the RPII/NCRI comments on the study and on how it relates to Ireland

Properties of Radon Gas

- Naturally occurring radioactive gas which arises from uranium present in all rocks and soils
- Colourless, odourless, tasteless and can be detected only with specialised detectors
- Radon is everywhere – outdoors radon is not a problem however indoors radon can sometimes accumulate to very high levels
- Enters buildings from the ground – pressure differentials

History of the Radon Problem

- 16th cen: Miners in Saxony/Germany die of "lung disease"
- 19th cen: Lung cancer in 75% of all Schneeberg miners
- 1950's: Association of lung cancer with Radon Established

History of the Radon Problem

- 1984 Stanley Watras – nuclear power worker in U.S.
  - set off alarm in the nuclear power plant
  - linked back to high levels of radon in his house
  - altered the philosophy of radiological protection

History of the Radon Problem

- Studies of miners consistently found link between radon and lung cancer
- Data from miners suggested radon may be a problem in homes though the risks associated with the data could not be applied directly

History of the Radon Problem

- Many differences between mines and homes
  - miners may be exposed to very high levels of radon. Not the case in homes
  - miners may work in dusty, particulate environments
  - some miners are exposed to other carcinogens e.g. arsenic and smoking history is limited in some miners studies

Assessing the Radon risk in Homes

- Smoking dominants the lung cancer issue
- Risk estimates derived from studies on miners estimated that 10 – 15% of lung cancers can be linked to radon. However the majority (85% – 90%) is linked to smoking.
- Also evidence appeared of the increased risks of radon and smoking though this could not be quantified and it was uncertain how to apply this to radon in homes

Assessing the Radon risk in Homes

- Thirteen European studies have tried to measure risks from radon in homes.
- All too small to be reliable on their own, but together and incorporating detailed smoking history they add up to the largest study ever done.
- EU sponsored study combined data from these studies. Over 7,000 lung cancer cases in 9 EU countries
- The report was published last December and RPII/NCRI published comments on the effects on Ireland in September.

Epidemiological study on radon in homes

- Radon causes about 20,000 lung cancer deaths a year in Europe. (2% of all cancer deaths).
- The risks to smokers (and ex-smokers) from radon is much greater than for life long non smokers.
- For active smokers the risk is 25 times than for non smokers

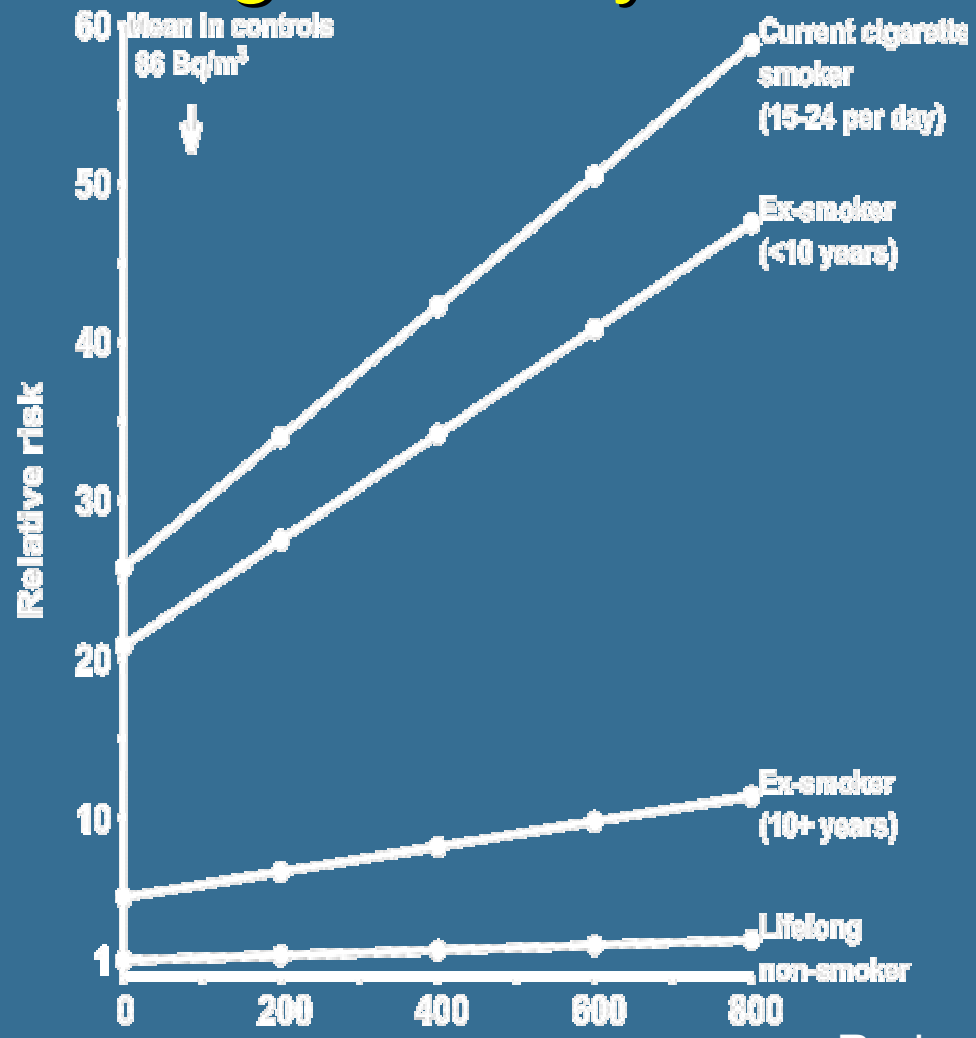
Epidemiological study on radon in homes

- Risks of getting lung cancer before age 75 at radon levels of 0,100, 200 and 400 Bq/m^3.

Radon Level (Bq/m^3)	0	100	200	400
Non-smoker	0.4%	0.47%	0.55%	0.67%
Smoker	10%	12%	13%	16%

- For both smokers and non smokers the risk increases by about 16% for every 100 Bq/m^3. This risk seems to apply at low radon levels.

Epidemiological study on radon in homes



Radon concentration Bq/m^3

Epidemiological study on radon in homes

- Risk to due radon alone at 200 Bq/m^3 is approximately 1 in 30 for smokers and about 1 in 700 for never smokers.
- Difference in risk is approximately 25 times
- Majority of radon induced lung cancer will be found in people whose lungs are damaged by tobacco smoke.
- Smokers and ex smokers (perhaps passive smokers)

What does this means for Ireland?

- Average radon levels in Ireland 91 Bq/m^3, the European average is 59 Bq/m^3.
- Appling these revised risk estimates to Ireland approximately 195 of the 1500 lung cancer deaths each year in Ireland are linked to radon. (13% of lung cancers)
- 178 (91%) among smokers and ex smokers 17 (9%) among never smokers

What does this means for Ireland?

- Ireland had a radon problem. One third of the country identified as High Radon Areas.
- RPII to date has identified over 3,400 homes > 200 Bq/m^3 and 200 as > 1000 Bq/m^3, the highest found was 49,000 Bq/m^3.
- Therefore residents of many Irish homes are at much higher risk than indicated earlier. That is much greater than 1 in 30 or 1 in 700 which are the risk for smokers and never smokers respectively at 200 Bq/m^3.

What does this means for Ireland?

Implications for the Reference Level

- RPII considered if the Reference Level should be altered
- If lowered to say 100 Bq/m^3 some 300,000 homes would be above the Reference Level. Significant resources needed to identify and remediate
- More importantly their remediation would result in small saving in radiation exposure than in the case of homes with larger concentrations
- In many areas society tackles risk by those who are most at risk. e.g. speeding. Reducing Reference Level would result in diversion of resources to those at low risk at the probable expense of efforts to identify those houses with high radon concentrations

What does this means for Ireland?

Implications for the Reference Level:

The number of smokers is falling. Radon presents a lower risk for never smokers therefore should the Reference Level be increased.

- In 1970's 46% of adults smoked. In 1990 some 30% smoke and in 2003 some 27% smoke.
- These ex-smokers and their families are at increased risk from radon
- In addition for never smokers risk from radon is still significant

What does this means for Ireland?

Implications for the Reference Level:

- How radon compares with other everyday risks

	No. of deaths
traffic accidents	~300
suicide	~400
radon (smoking/ex smokers)	178
radon (never smoke)	17
cervical cancer	~70
workplace accidents	60-70
meningitis (2003)	17

What does this means for Ireland?

Implications for the Reference Level:

- No justification to revising the Reference Level as it represented a level of risk to the whole population comparable with other everyday hazards.

Conclusions

- The results of this most recent study strengthens previous estimates on the number of deaths due to radon. That is approximately 200 people per year die from radon induced lung cancers. Therefore it represents a significant hazard to the public.
- It confirmed radon in homes can be a significant hazard.
- It quantified the risk of smoking and radon and showed that the majority of radon induced lung cancer will be observed in people whose lungs have been damaged by tobacco smoke.
- RPII found no justification to recommend altering the national Reference Level

Acknowledgement

- RPII would like to thank the NCRI for their assistance in reviewing this work

- The full statement of review of the radon epidemiological study is published on www.rpii.ie/radon.

Thank you for your attention