VALLADOLID 14 DE MARZO 2019

Radón: Un problema de salud publica

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Catedrático de la Universidad de Cantabria

GRUPO RADON

UNIVERSIDAD DE CANTABRIA

GRUPO RADON

42 años con la radiacion natural

http://www.hpa.org.uk/ProductsServices/Radiation/RadonMeasurementServices/radon03Validation/

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Health Protection Agency

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- Radiochemical Analysis
- Radiotherapy
- Body Monitoring Services

Validation Scheme for Laboratories

In 1991, the National Radiological Protection Boa Protection Division of the HPA, announced a valid making radon measurements in homes. The gov responsibility for radon in dwellings have request Ireland Housing Executive to give favourable cons which are supported by measurements carried o participating in the scheme. The validation schem laboratory, and requires that measurements in h three-month period.

The following laboratories have been validated:

Laboratory	Telephone	Fax	
Health Protection Agency Centre for Radiation, Chemical and Environmental Hazards Chilton Didcot Oxon OX11 0RQ	+44 (0)1235 831600	+44 (0)123 833891	
DSTL Radiation Protection Services Institute of Naval Medicine Gosport Hants PO12 2DL	+44 (0)2392 768294	+44 (0)2392 768150	rpstokes@dstl.gov.uk
Gammadata	+44 (0)1905	+44 (0)1905	chris.bradburn@gammadata.se
LaRUC (Radon Group) Departamento de Ciencias Medicas y Quirurgicas Facultad de Medicina Universidad de Cantabria Avenida Cardenal Herrera Oria s/n 39011 Santander SPAIN	+34 942202207	+34 942201903	laruc@unican.es

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ENAC
ENSAYOS
Nº 1204/LE2219


RC-4011A

V ANIVERSARIO DEL LABORATORIO DE RADIACION NATURAL

(2011-2016)

Noviembre, 2016

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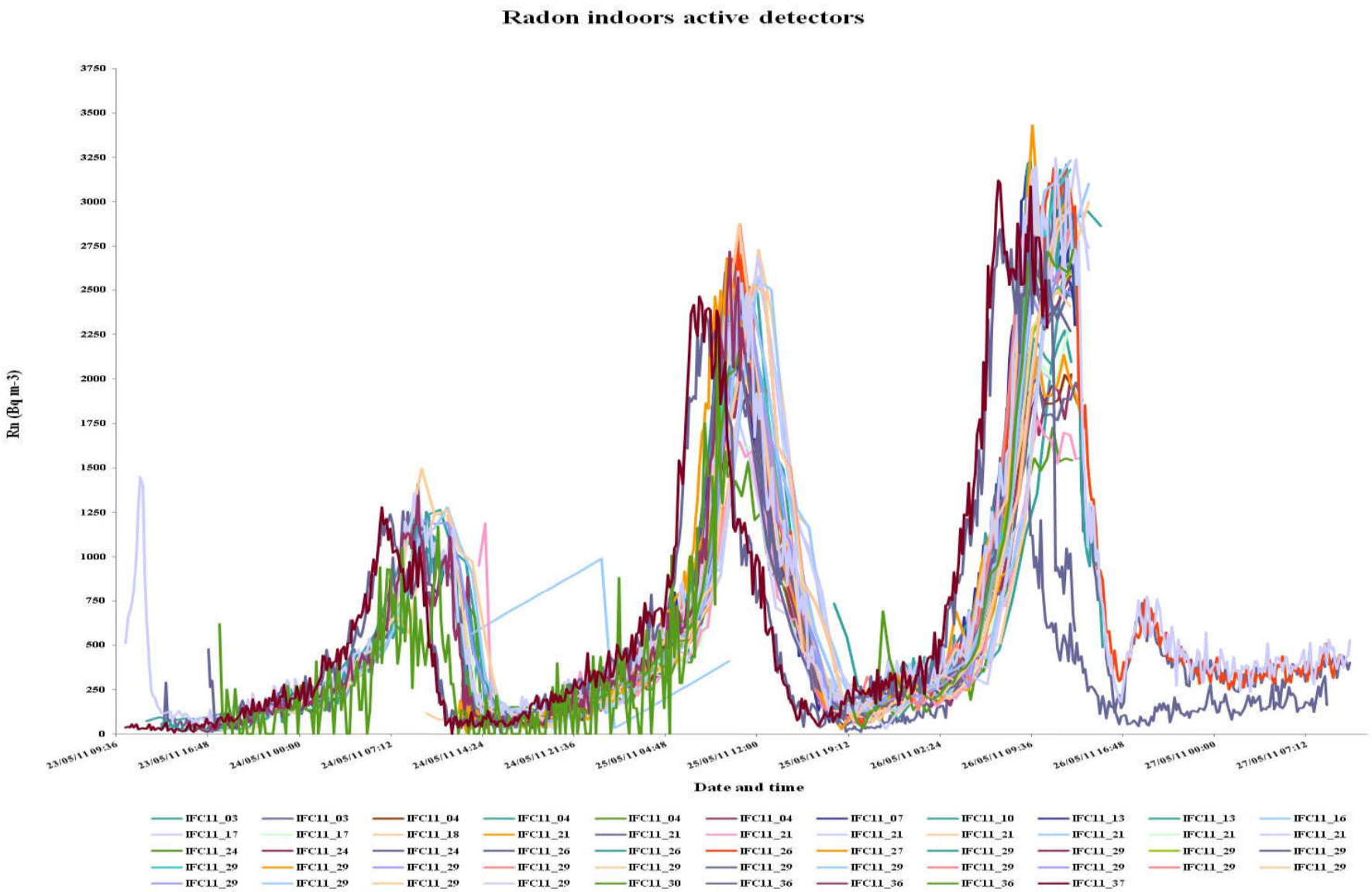
Radon indoors active detectors
Rn (Bq m-3)
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
23/05/11 09:36
23/05/11 16:48
24/05/11 00:00
24/05/11 07:12
24/05/11 14:24
24/05/11 21:36
25/05/11 04:48
25/05/11 12:00
25/05/11 19:12
26/05/11 02:24
26/05/11 09:36
26/05/11 16:48
27/05/11 00:00
27/05/11 07:12
Date and time
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IFC11_03
IFC11_04
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IFC11_37

EMPIR EURAMET

The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

Horizon 2020
European Union Funding
for Research & Innovation

GENERAL MULTI-BENEFICIARY GRANT AGREEMENT FOR

EUROPEAN METROLOGY PROGRAMME FOR INNOVATION AND RESEARCH (EMPIR)[1]

NUMBER: 16ENV10 MetroRADON

RADON

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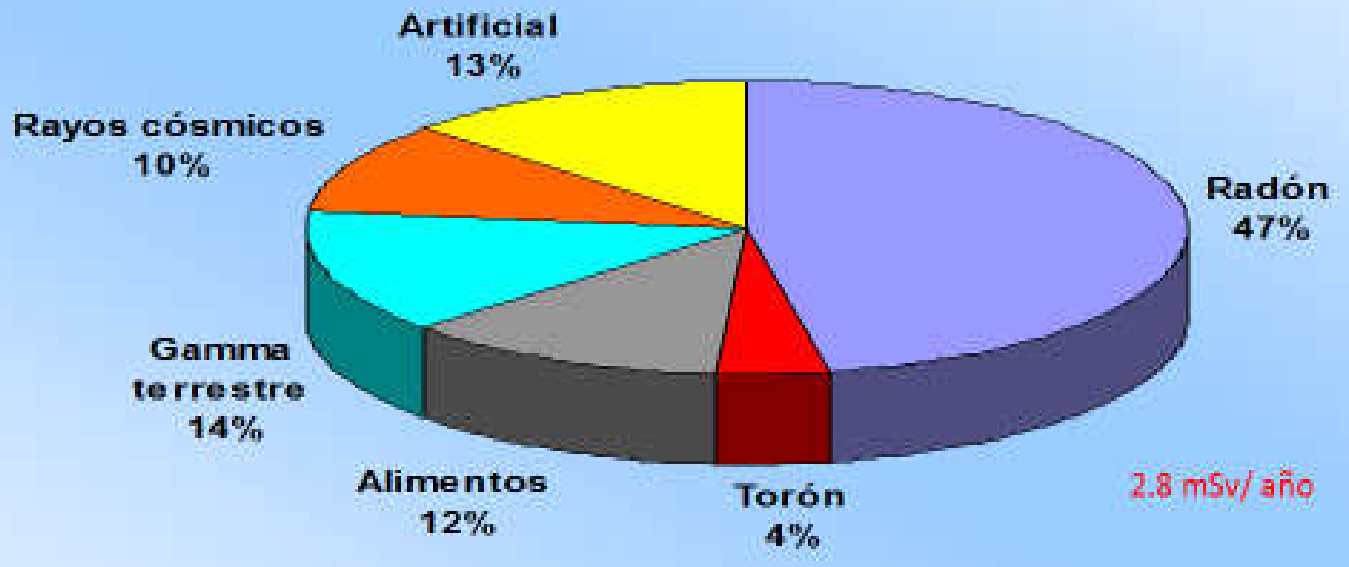
Exposición promedio del hombre a fuentes naturales y artificiales

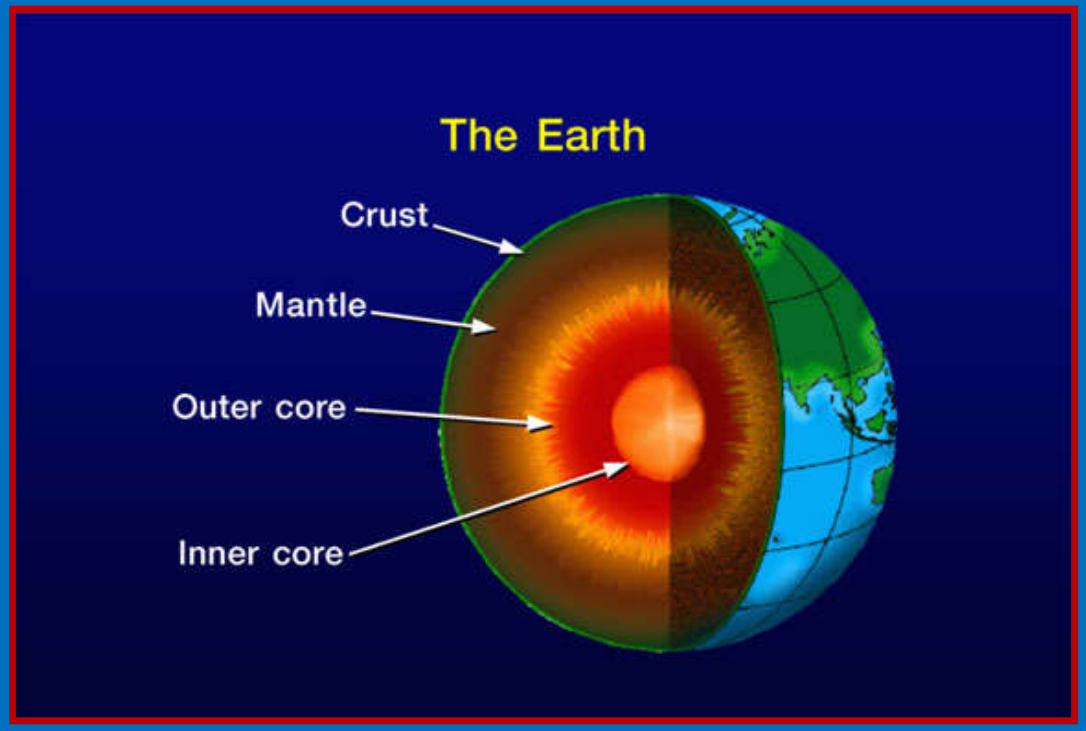


2.8 mSv/ año

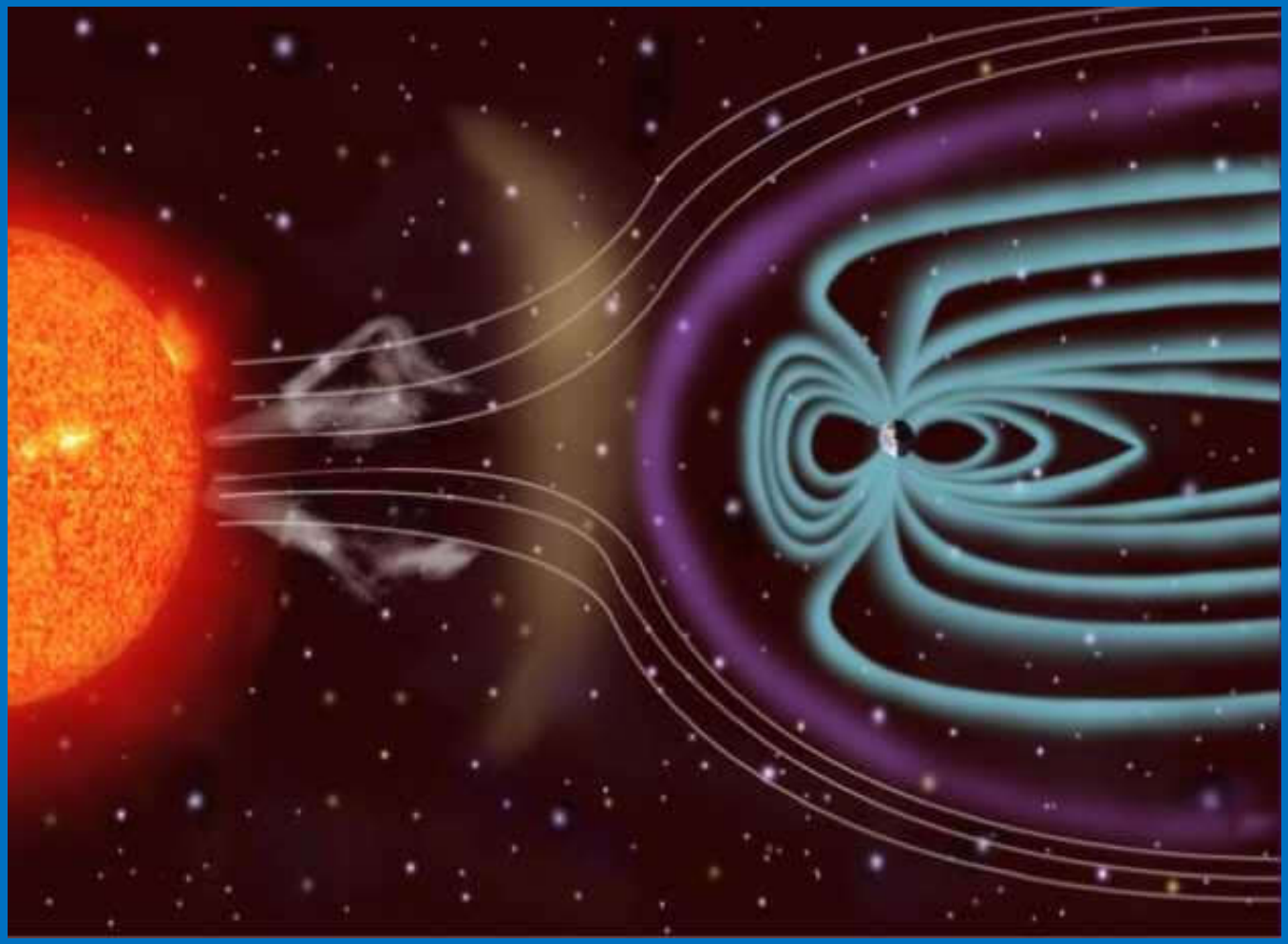
FUENTE: UC, CSN

14 % : RADIACION GAMMA TERRESTRE

1. Fuente de calor interno



10 %: RADIACION COSMICA

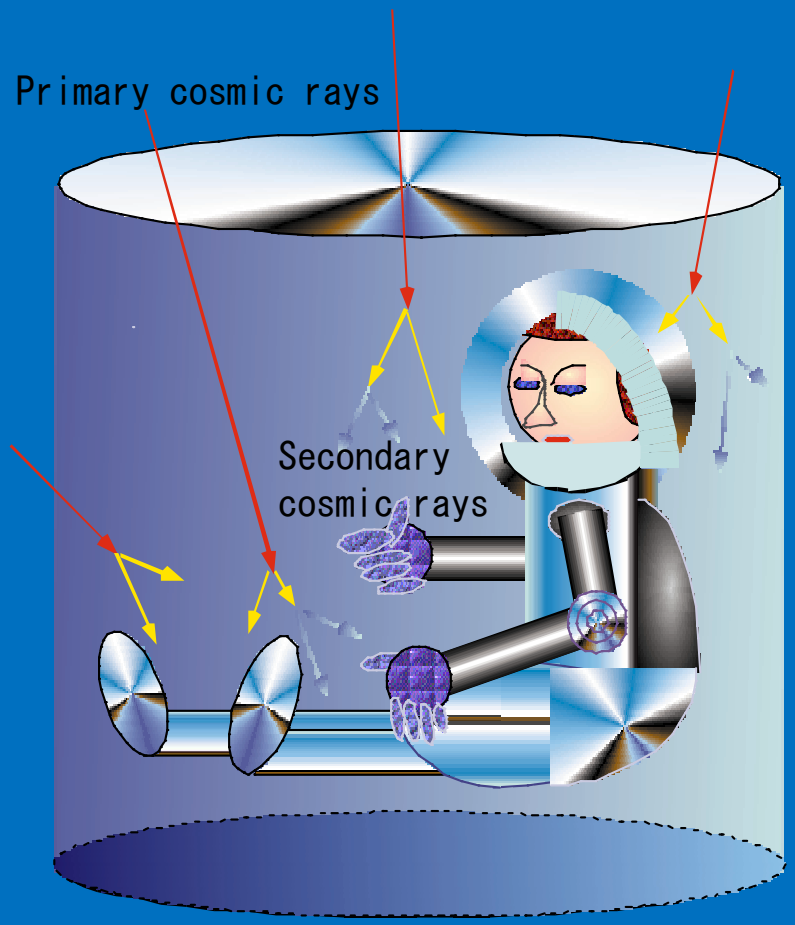


Fuente: Jose Carlos Saez Vergara. CIEMAT

Dosis recibidas en vuelos orbitales y estaciones espaciales (MIR, ISS)

- La tasa de dosis varía entre 5 y 40 μSv/h, y las dosis por misión oscila entre 3 y 11 mSv.

Fuente: Jose Carlos Saez Vergara. CIEMAT



Aprox. 1 mSv/dia

Astronauts are also exposed to secondary part
(heavy ions, protons, neutrons,
pions, muons, electrons)

12 %: ALIMENTOS

5 % : GAS TORON

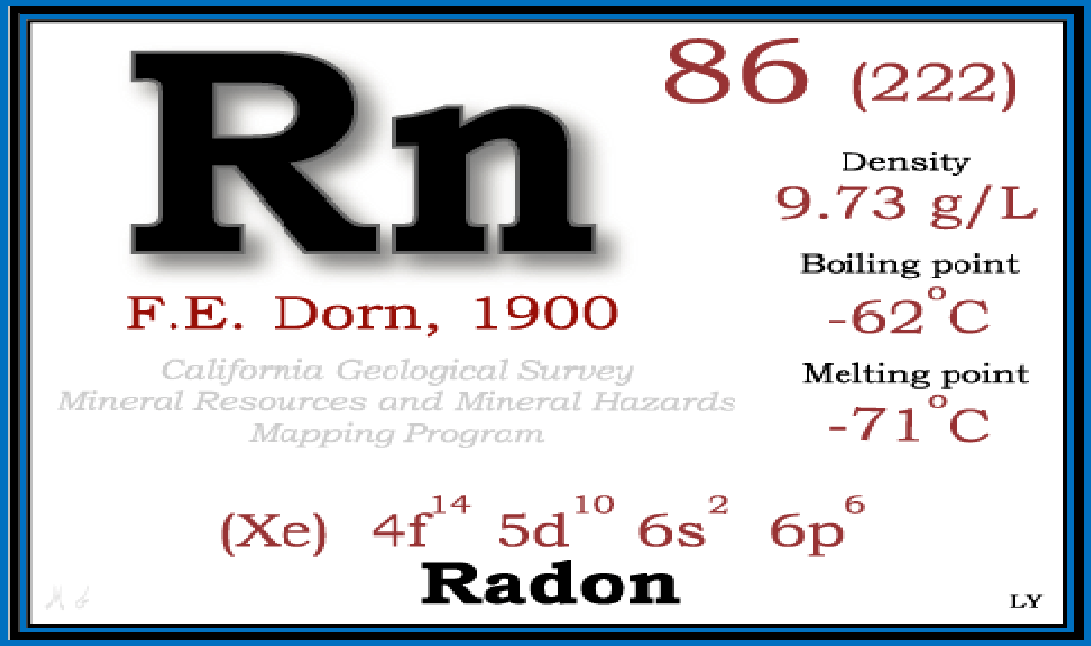
ARTIFICIAL: USO MEDICO : 13%

TOTAL ANUAL : 2.8 mSv

RADIOGRAFIA DE TORAX: 0.05 mSv
SCANER, PROMEDIO: 10 mSv

¡CUIDADO LOS “POR QUE SI”

NOBLE GAS
RADIOACTIVE: 47 %



Origin of radon

Mineros (años 70)

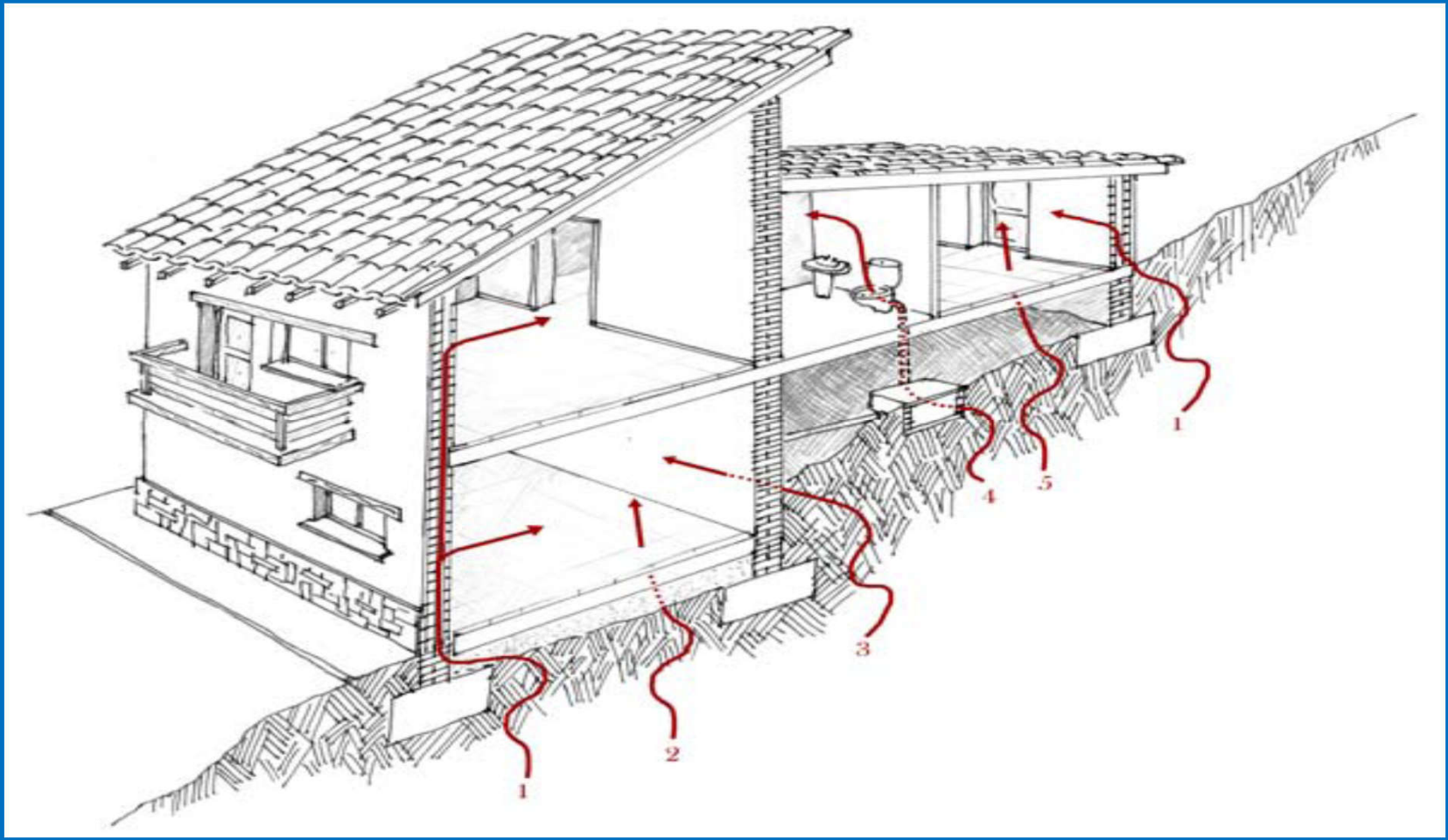
Fuentes de radon

Transporte

Difusión
(<5%)

Convección
(95%)

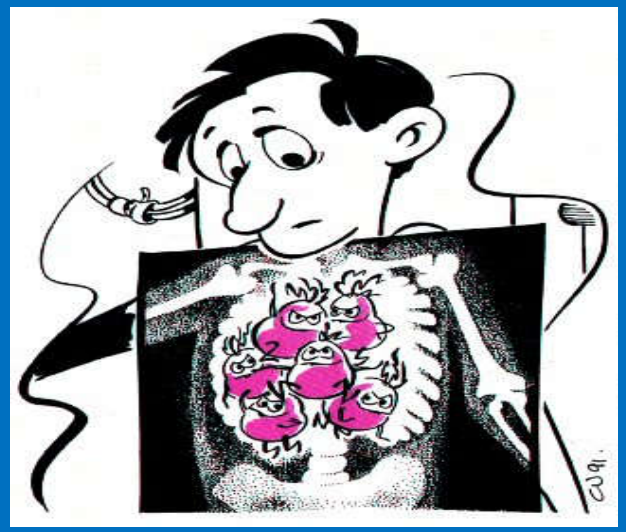
Entradas de radon



GRANITOS

Mas de 200 tipos….

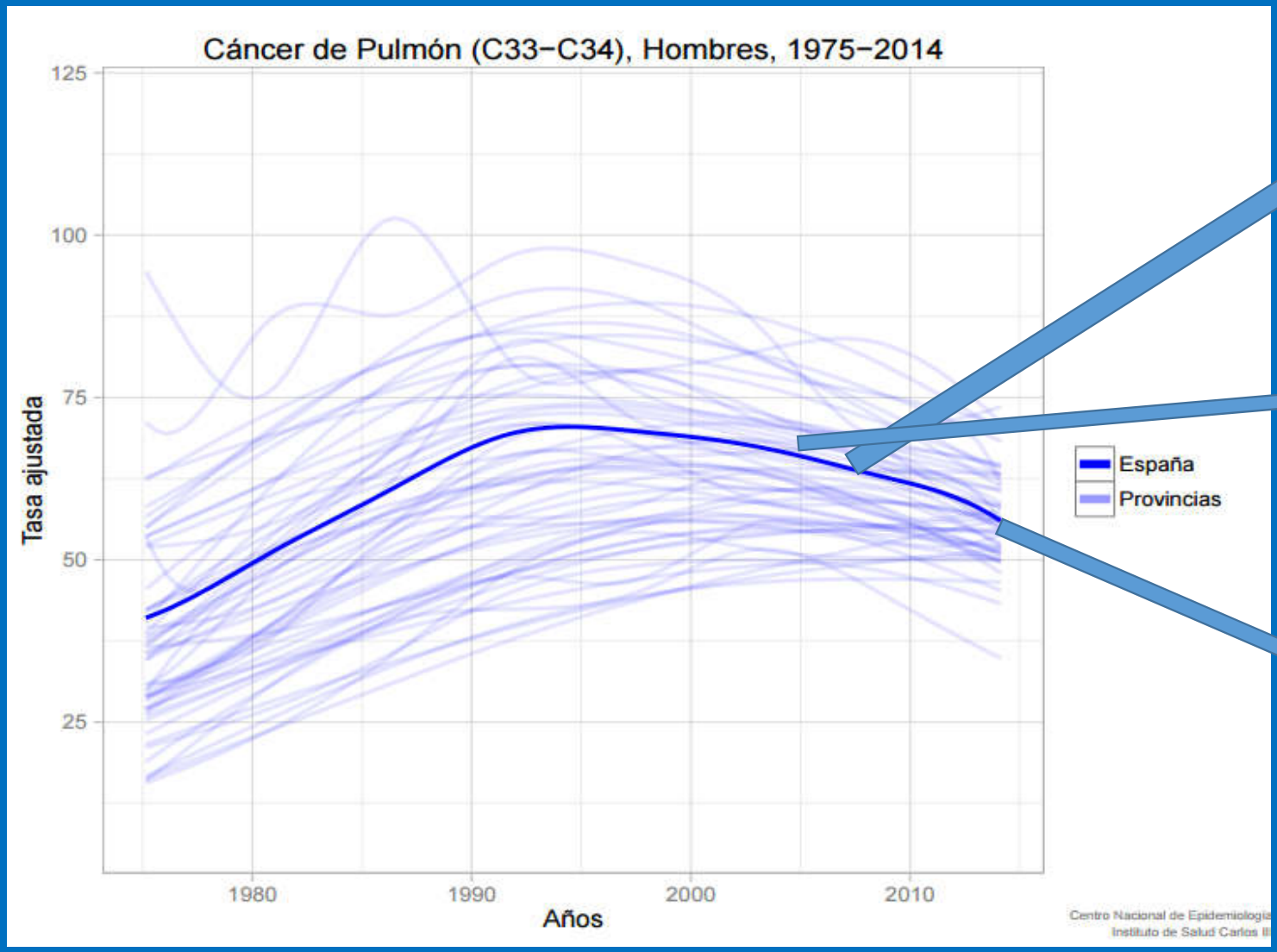
Riesgo para la salud



Inhalacion de descendientes del gas radon

Cancer de pulmon

Source:
INSTITUTO DE SALUD CARLOS III

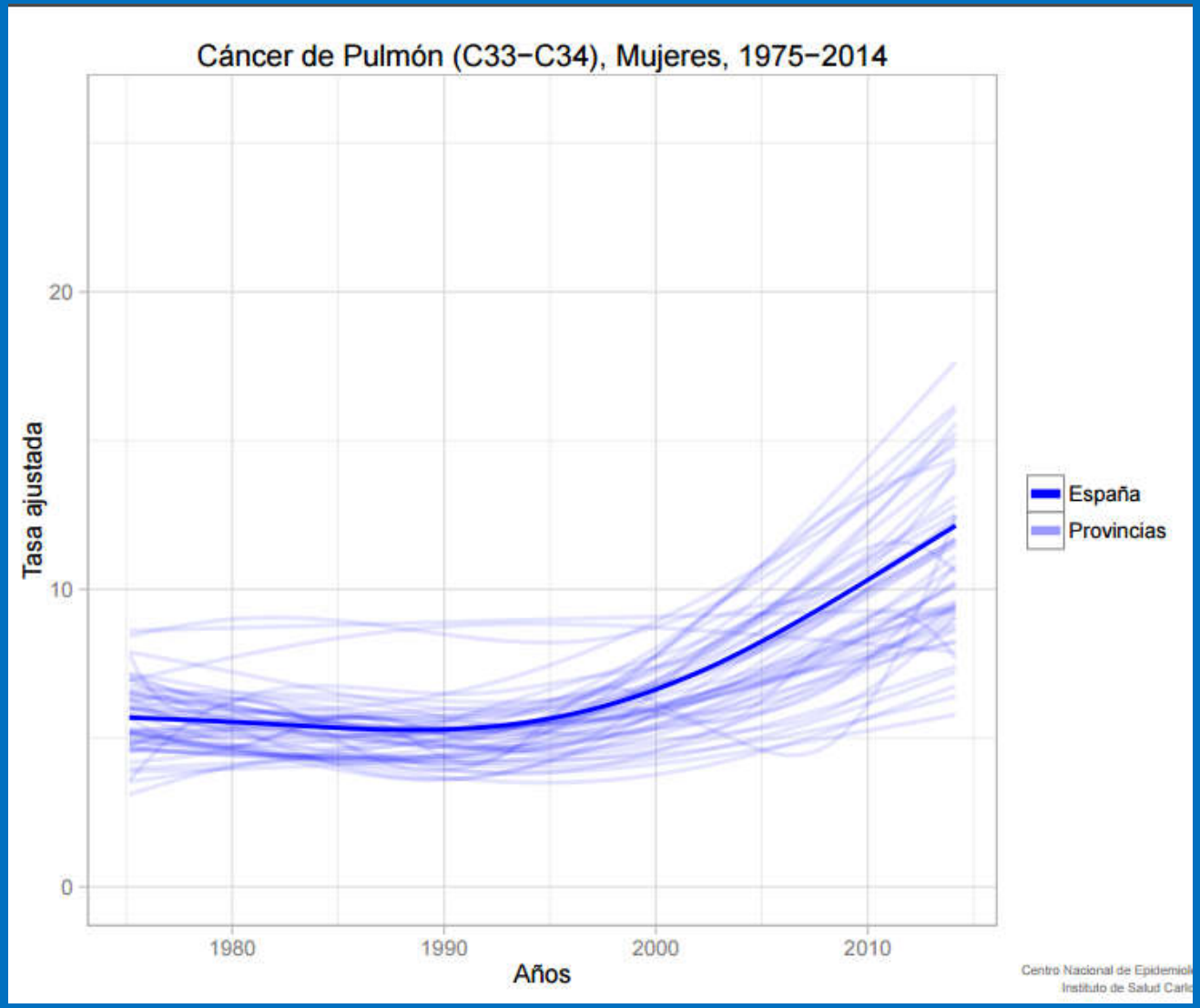


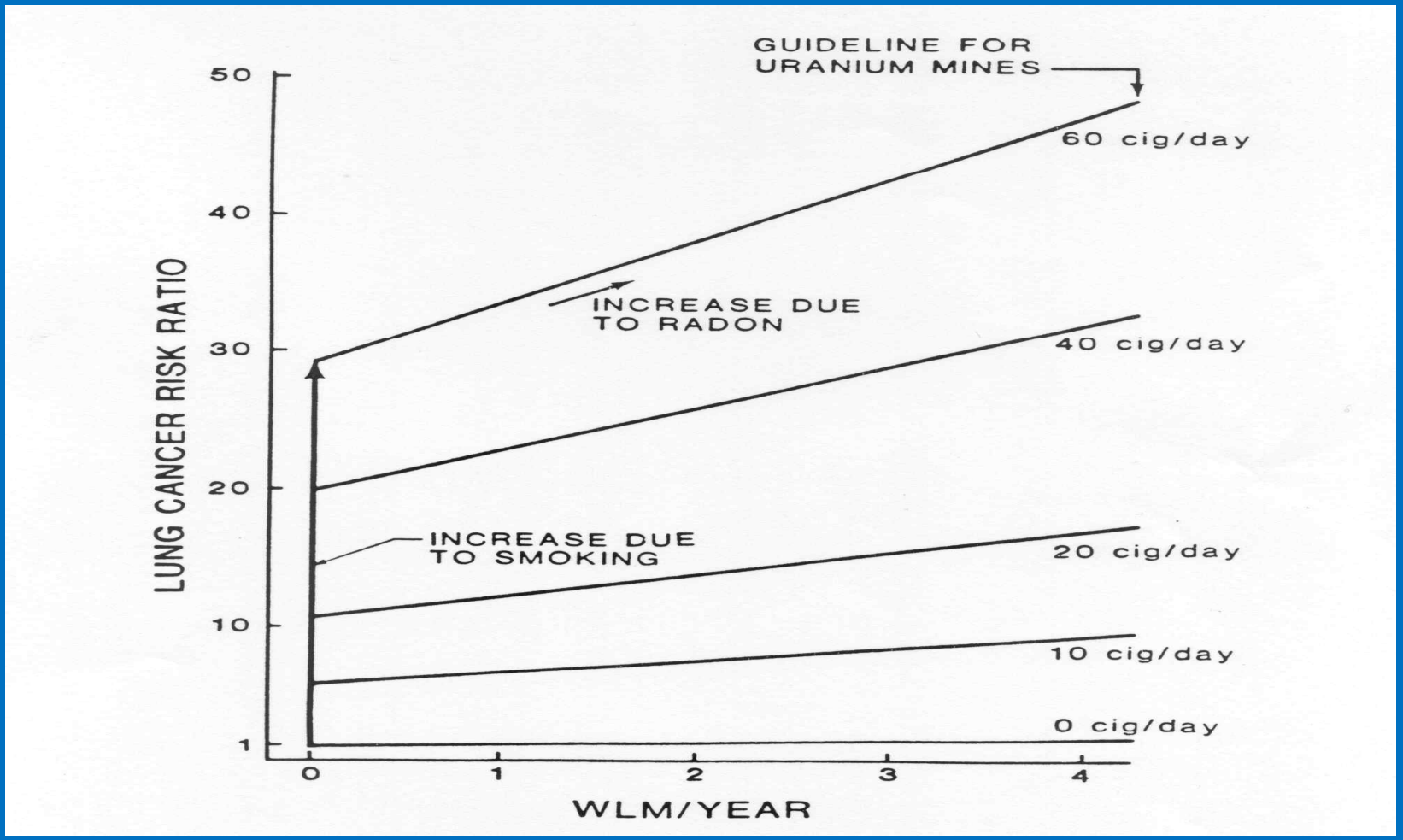
LEGISLATION, 2006

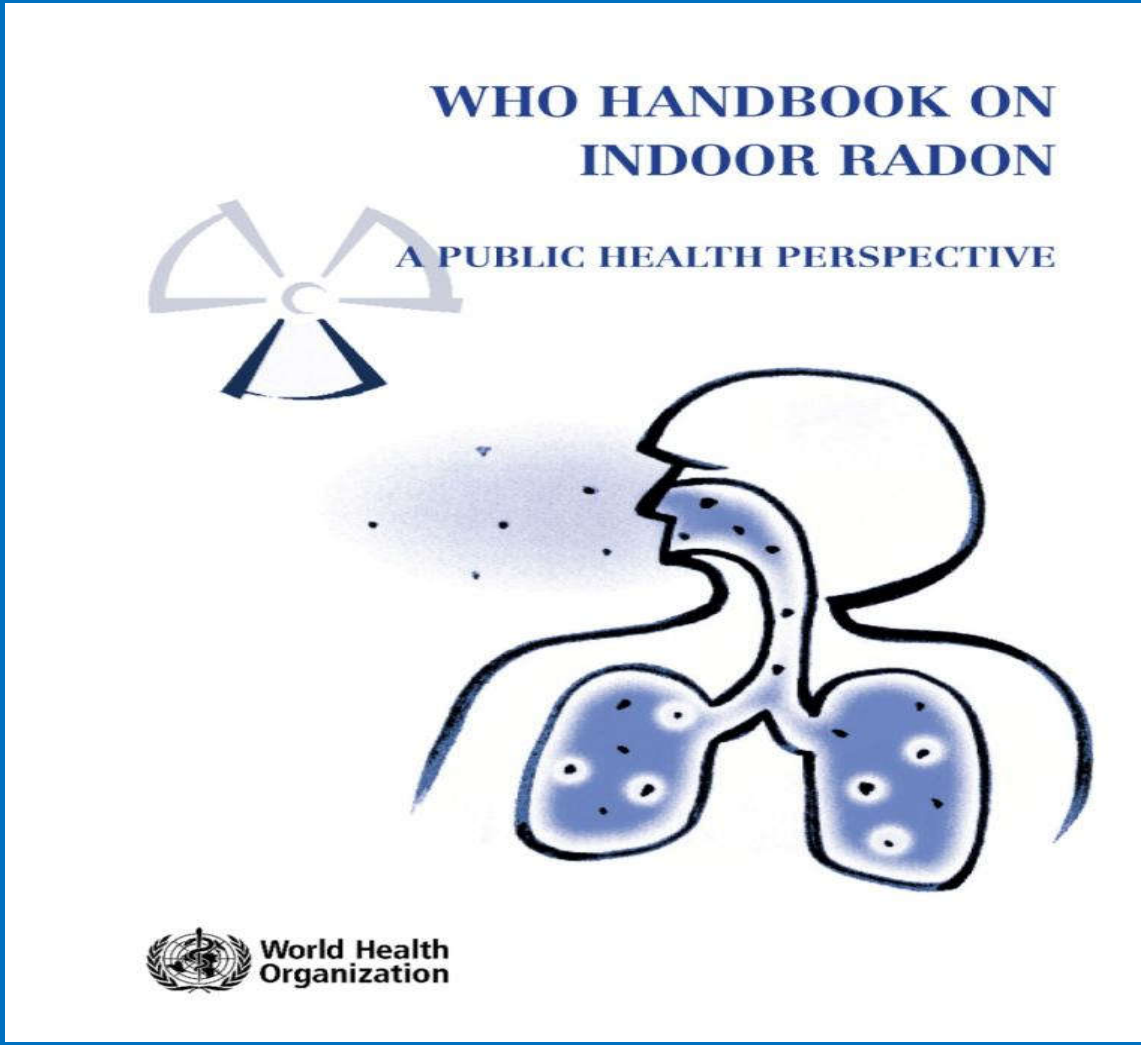
4,663 millones de cajetillas 2004

2,340 millones de cajetillas 2014

Source:
INSTITUTO DE SALUD CARLOS III




GUIDELINE FOR
URANIUM MINES
60 cig/day
INCREASE DUE
TO RADON
40 cig/day
INCREASE DUE
TO SMOKING
20 cig/day
10 cig/day
0 cig/day
LUNG CANCER RISK RATIO
50
40
30
20
10
1
0
1
2
3
4
WLM/YEAR



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INTERNATIONAL
RADON
PROJECT
(2005-2009)

Table 13. Number and percentage of the annual lung cancers attributable to radon and 95% confidence intervals (CI): males + females.

	Country	Average Rn conc. (Bq m^{-3})	Average LC deaths per year	Annual LC deaths attributable to Rn: Number (95%CI)	Annual LC deaths attributable to Rn: Percentage (95%CI)
	EU MEMBER STATES				
1	Austria	99	3 533	483 (167–830)	14% (5%–23%)
2	Belgium	52	6 264	481 (159–870)	8% (3%–14%)
3	Bulgaria	29	3 372	150 (48–278)	4% (1%–8%)
4	Cyprus	29	177	8 (3–15)	4% (1%–8%)
5	Czech Republic	118	5 483	871 (305–1 468)	16% (6%–27%)
6	Denmark	53	3 551	278 (92–501)	8% (3%–14%)
7	Estonia	60	673	59 (20–105)	9% (3%–16%)
8	Finland	96	2 003	267 (92–459)	13% (5%–23%)
9	France	63	28 138	2 577 (859–4 597)	9% (3%–16%)
10	Germany	49	41 982	3 052 (1 004–5 536)	7% (2%–13%)
11	Greece	55	6 213	502 (166–905)	8% (3%–15%)
12	Hungary	107	8 046	1 176 (409–2 004)	15% (5%–25%)
13	Ireland	91	1 663	211 (72–366)	13% (4%–22%)
14	Italy	70	32 907	3 314 (1 113–5 867)	10% (3%–18%)
15	Latvia	70	1 062	107 (36–189)	10% (3%–18%)
16	Lithuania	55	1 414	114 (38–206)	8% (3%–15%)
17	Luxembourg	110	208	31 (11–53)	15% (5%–25%)
18	Malta	40	144	9 (3–16)	6% (2%–11%)
19	Netherlands	23	9 858	350 (112–656)	4% (1%–7%)
20	Poland	49	22 062	1 604 (528–2 909)	7% (2%–13%)
21	Portugal	62	3 381	305 (102–545)	9% (3%–16%)
22	Romania	50	9 343	855 (285–1 526)	9% (3%–16%)
23	Slovakia	108	2 052	302 (105–515)	15% (5%–25%)
24	Slovenia	87	1 078	132 (45–229)	12% (4%–21%)
25	Spain	53	19 856	1 552 (513–2 802)	8% (3%–14%)
26	Sweden	108	3 509	517 (180–880)	15% (5%–25%)
27	United Kingdom	20	34 538	1 071 (342–2 016)	3% (1%–6%)
	SOME OTHER EUROPEAN COUNTRIES				
28	FYROM	105	618	89 (31–152)	14% (5%–25%)
29	Norway	89	2 049	255 (87–443)	12% (4%–22%)
30	Switzerland	78	2 747	305 (103–535)	11% (4%–19%)

RADPAR project UE (2009-2011)

EUROPEAN CODE AGAINST CANCER

12 ways to reduce your cancer risk

1. Do not smoke. Do not use any form of tobacco.
2. Make your home smoke free. Support smoke-free policies in your workplace.
3. Take action to be a healthy body weight.
4. Be physically active in everyday life. Limit the time you spend sitting.
5. Have a healthy diet:
   - Eat plenty of whole grains, pulses, vegetables and fruits.
   - Limit high-calorie foods (foods high in sugar or fat) and avoid sugary drinks.
   - Avoid processed meat; limit red meat and foods high in salt.
6. If you drink alcohol of any type, limit your intake. Not drinking alcohol is better for cancer prevention.
7. Avoid too much sun, especially for children. Use sun protection. Do not use sunbeds.
8. In the workplace, protect yourself against cancer-causing substances by following health and safety instructions.
9. Find out if you are exposed to radiation from naturally high radon levels in your home. Take action to reduce high radon levels.
10. For women:
    - Breastfeeding reduces the mother's cancer risk. If you can, breastfeed your baby.
    - Hormone replacement therapy (HRT) increases the risk of certain cancers. Limit use of HRT.
11. Ensure your children take part in vaccination programmes for:
    - Hepatitis B (for newborns)
    - Human papillomavirus (HPV) (for girls).
12. Take part in organized cancer screening programmes for:
    - Bowel cancer (men and women)
    - Breast cancer (women)
    - Cervical cancer (women).

The European Code Against Cancer focuses on actions that individual citizens can take to help prevent cancer. Successful cancer prevention requires these individual actions to be supported by governmental policies and actions.

Find out more about the European Code Against Cancer at: http://cancer-code-europe.iarc.fr

International Agency for Research on Cancer

World Health Organization

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IARC, 2016

European Commission

¿ ES IMPORTANTE LA POBLACION TRABAJADORA AFECTADA ?

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Tabla 1. Estimaciones de exposición para los 15 cancerígenos más frecuentes en la población Española. Estimación para la población activa, 2004

Agente / Nº exposiciones*

Radiación solar / 1.460.460

Sílice, cristalino / 1.246.787

Humo de tabaco (ambiental) * / 1.223.146

Humo de motor diesel / 586.890

Polvo de madera / 497.332

Radón y sus productos descompuestos / 456.891

Fibras minerales artificiales / 176.054

Compuestos de Cromo VI / 150.539

Hidrocarbonos poli cíclicos aromáticos (excluido humo de tabaco) / 138.181

Benceno / 128.589

Formaldehído / 113.403

Componentes del níquel / 90.964

Plomo y compuestos de plomo, inorgánico / 67.865

Amianto / 65.548

** Estimación antes de la Ley antitabaco*

Fuente:

Informe Carex-España, 2004

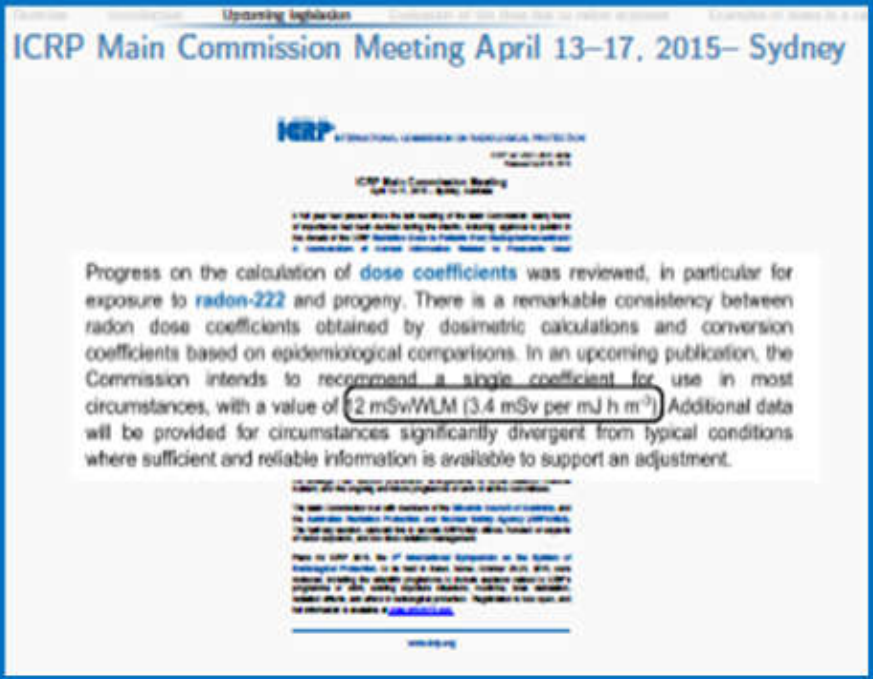
ARTIFICAL vs NATURAL

AÑO 2009

Nº DE TRABAJA DORES	Fondo	< 5 mSv	> 5 mSv < 20 mSv	> 20 mSv < 50 mSv	> 50mSv
89004 105150 (2013)	52325	35362	1255	53	9

Radon: 3000 Bq/m^3; 1700 h; F=0.4 ⟷ 16.2 mSv/año
38.8 mSv/año

Fuente: Consejo de Seguridad Nuclear



Upcoming legislation

ICRP Main Commission Meeting April 13–17, 2015– Sydney

Progress on the calculation of dose coefficients was reviewed, in particular for exposure to radon-222 and progeny. There is a remarkable consistency between radon dose coefficients obtained by dosimetric calculations and conversion coefficients based on epidemiological comparisons. In an upcoming publication, the Commission intends to recommend a single coefficient for use in most circumstances, with a value of 12 mSv/WLM (3.4 mSv per mJ h m^{-3}). Additional data will be provided for circumstances significantly divergent from typical conditions where sufficient and reliable information is available to support an adjustment.