Time to re-evaluate the risks of radioactivity The 2010 report of the European Committee on Radiation Risk

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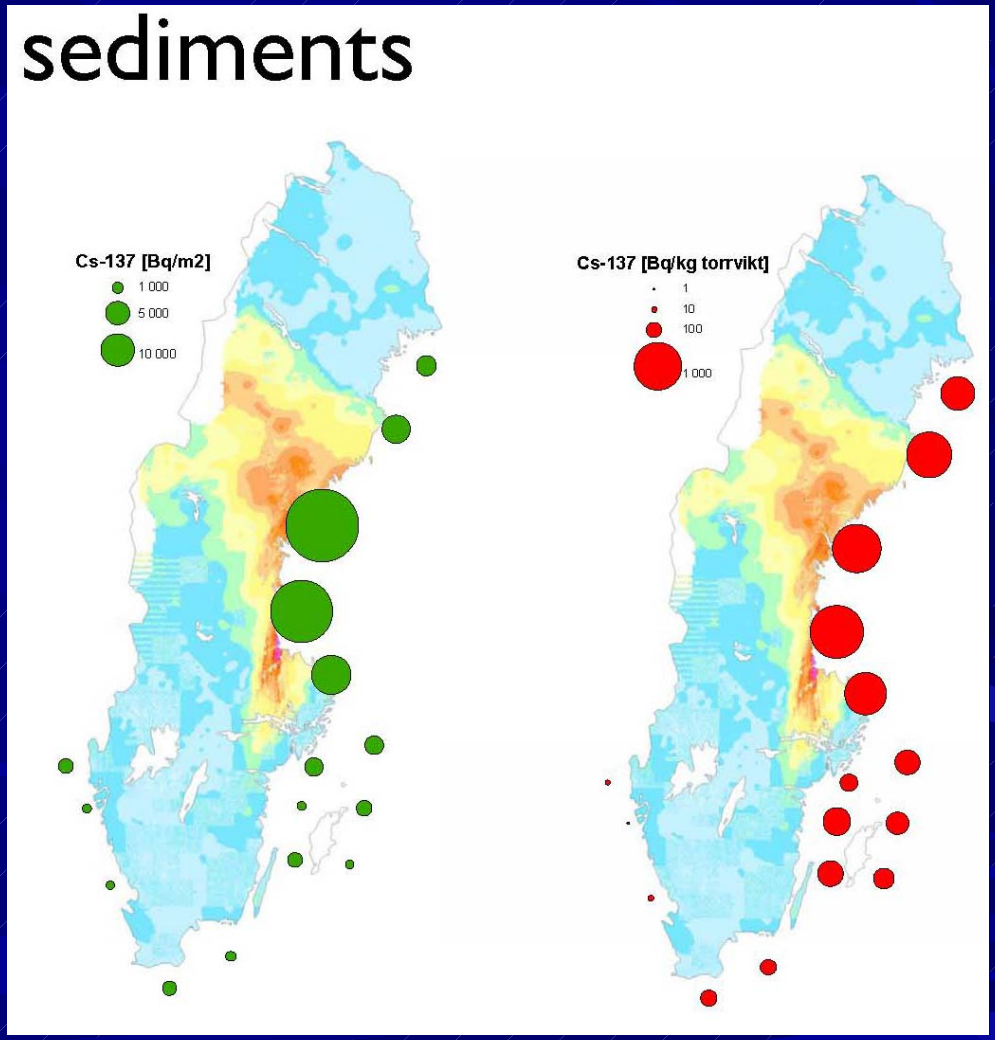
Sweden standardised Breast Cancer rates/10^5

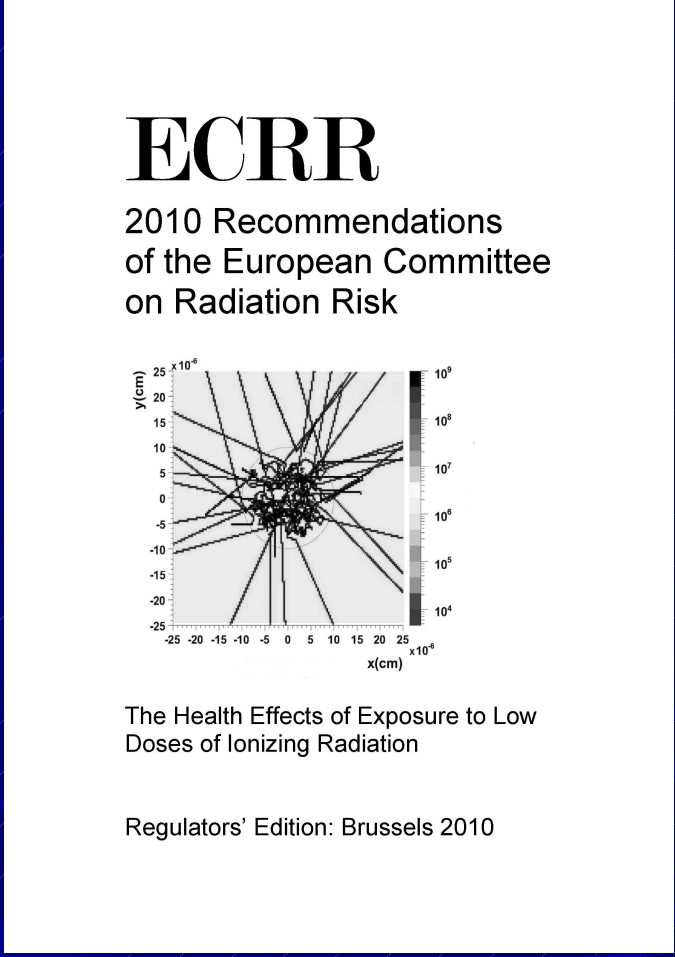
County	84	85	mean	88	89	90	91	mean	%Δ
BALTIC									
Stockholm	110	118	114	119	124	141	141	131	+15
Blekinge	87	117	103	131	120	145	131	132	+28
Kalmar	103	103	103	130	107	103	107	112	+9
Uppsala	106	114	110	112	119	142	125	125	+13
Gavleborgs	81	79	80	80	86	100	101	92	+15
VasterN	102	96	99	86	99	142	134	115	+16
Skane	106	114	110	112	119	142	125	125	+13
Hallands	92	106	99	98	130	141	104	118	+19
VasterG	104	105	105	116	123	133	133	126	+21
INLAND									
Varmlands	90	96	93	82	99	87	103	93	0
Dalarnas	113	114	114	93	115	95	100	101	-11
Jamtlands	103	119	111	98	77	79	106	90	-19

Caesium-137 in Baltic Marine sediments HELCOM 2009



The 2010 recommendations of the European Committee on Radiation Risk

- This new report updates and develops the radiation risk model of the ECRR, published in 2003. ECRR2003 was reprinted 3 times and translated into Japanese, Russian, French and Spanish.



ECRR and ICRP

- There are now two committees and two models for the health effects of low dose radiation. The embarrassing inability of the current risk model of the International Committee on Radiation Protection to predict or explain the observed health effects led to the founding in 1997 in Brussels of the European Committee on Radiation Risk, the ECRR
- The ECRR2010 risk model presented here (available from www.euradcom.org) updates and develops the ECRR2003 report and includes analysis of developments and a new chapter on Uranium

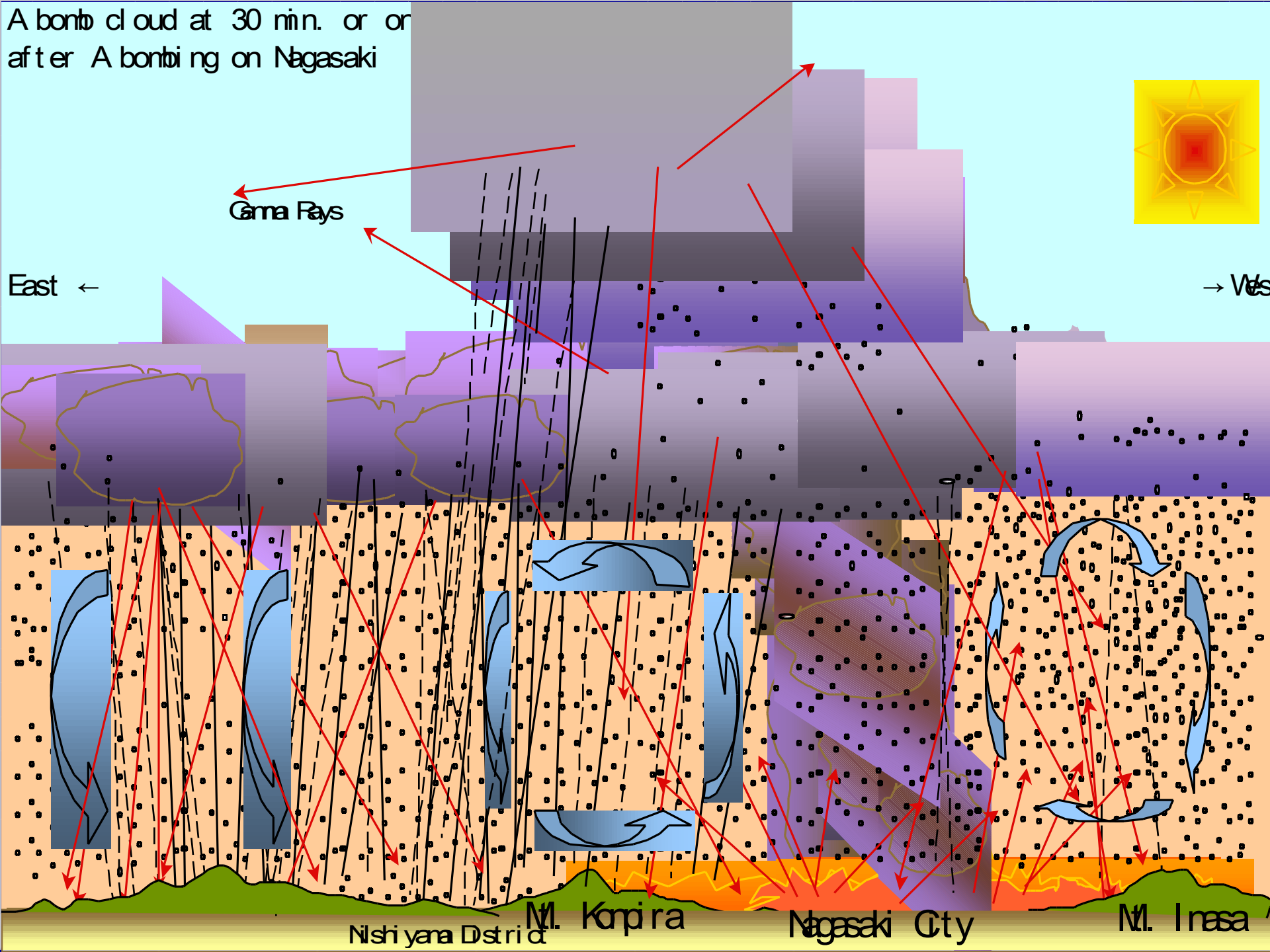
Main types of Radiation Impact

- Electromagnetic radiation is an energetic form of light: this includes gamma radiation and X-rays. Gamma rays pass right through you and the electron tracks produced are sparsely ionising.
- Charged particle radiation: includes energetic electrons (beta) and slower highly ionising alpha particles. These are released from radioactive materials like natural Uranium, Potassium-40 and also man-made substances called radionuclides, like Plutonium-239, Caesium-137 and Strontium-90. These are made by the fission of Uranium-235 and since 1945 have contaminated the entire biosphere. Beta tracks vary in their ionising density but alpha tracks are highly ionising.
- Secondary emissions (photoelectrons, Auger electrons) from internal high atomic number elements, Uranium, platinum, lead, gold etc.

1. Ionising radiation, whatever its source or type, is absorbed by materials with the creation of charged particle tracks which leave structured paths of ions and reactive chemical species.
2. It is these fragments that react with DNA and cause fixed mutations and cancer.
3. The absorption of gamma radiation is proportional to the fourth power of the atomic number of the absorbing material; remember this! We'll need it later on.

Radiation exposure and health. The ICRP risk model

- Health effects currently modelled on the basis of cancer yield in survivors of Hiroshima and Nagasaki bombs. This is the model of the International Commission on Radiological Protection (ICRP)
- In this model, the numbers of cancers in the survivors who were exposed to a single large acute EXTERNAL flash of gamma radiation are correlated with the ABSORBED DOSE and a straight line is drawn between this yield and no dose.
- The method is based on the assumption that all cells in the body receive the same number of radiation tracks.
- But this is not a valid assumption for INTERNAL radiation where track density varies from place to place.


A bomb cloud at 30 min. or or
after A bombing on Nagasaki
Gamma Rays
East ←
→ Wes
Nishiyama District
Mt. Kompira
Nagasaki City
Mt. Inasa

Fission Products are produced, Strontium-90, Caesium-137 etc

The discovery in 1944 that the atoms of the natural isotope Uranium-235 would spontaneously split, with the release of massive amounts of energy in the form of gamma rays and particles led to the development of the atomic and hydrogen bombs.

These were used against the Japanese at Hiroshima and Nagasaki in 1945.

This event began the systematic pollution of the planet with entirely novel substances, never seen on earth throughout evolution.

The ICRP and ECRR models

ICRP is a physics-based system which dilutes average energy (Joules) into a mass (Kg) of tissue (water) to obtain a quantity "Dose".

It ignores chemistry, cell biology and physiology and ignores effects at the DNA.

ECRR is a chemistry/ radiobiology/ physiology based system. Ionization density at the DNA cell target is assessed on the basis of radionuclide affinity for DNA and behaviour. Doses are adjusted by weighting factors

EXTERNAL EXPOSURE is modelled by physics
ICRP phantom: body is modelled as a bag of water and radiation is assumed external. ABSORBED DOSE is ENERGY divided by MASS, Joules/Kg = Gray
This method gives same dose for warming yourself in front of a fire or eating a hot coal.

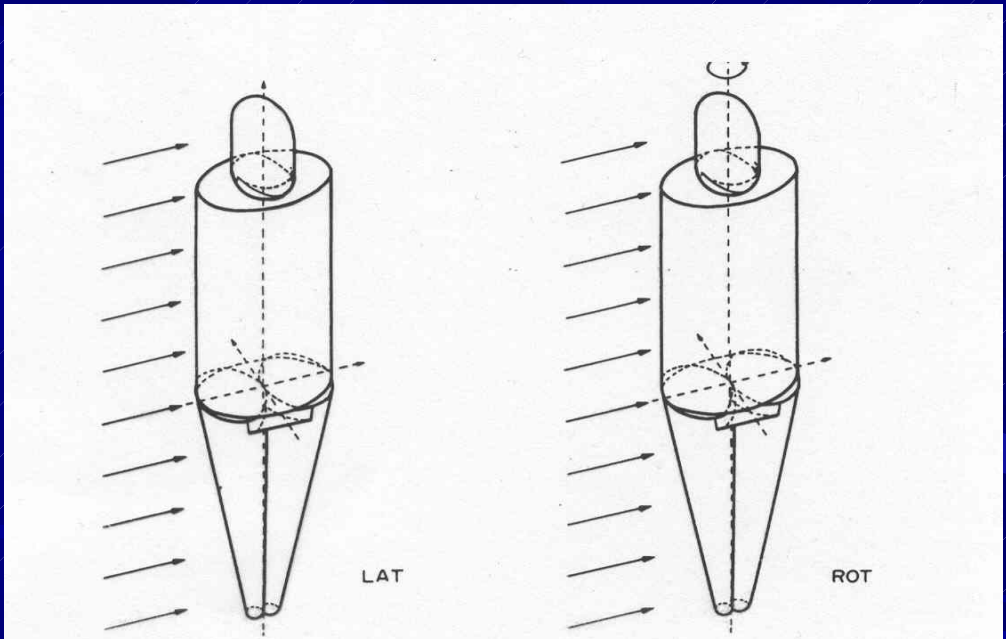
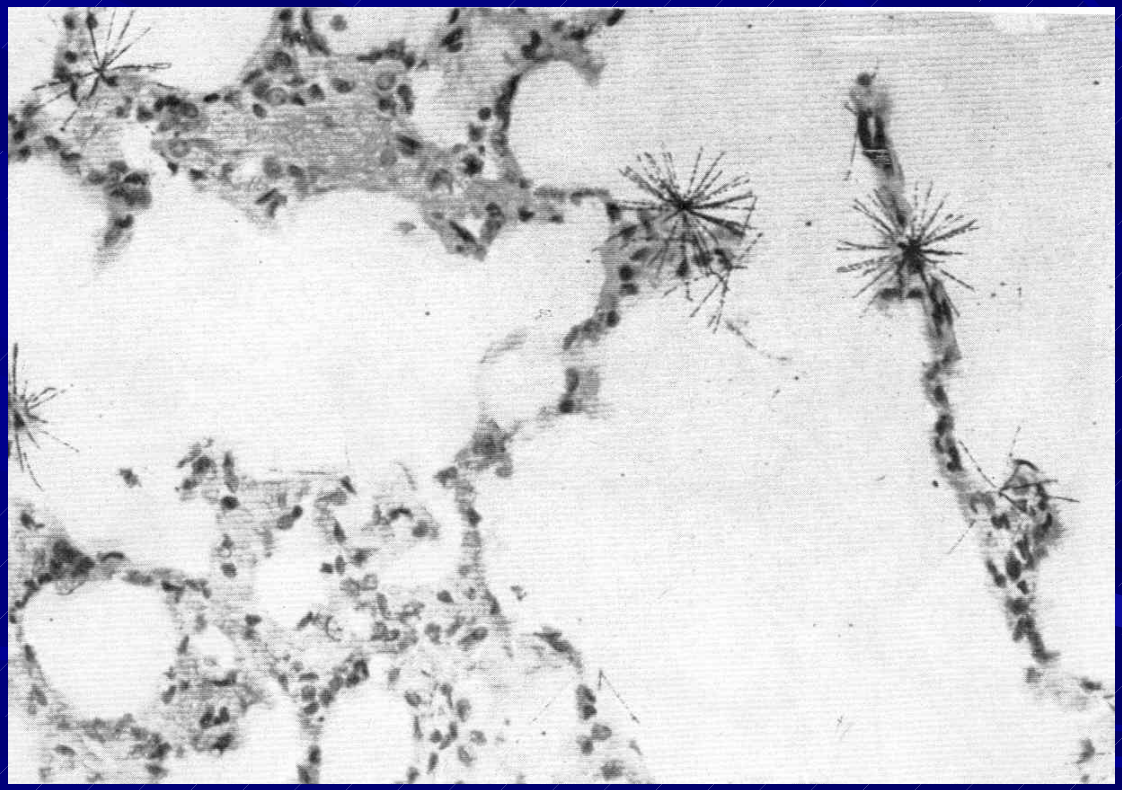


Fig. 1. Some irradiation geometries with an anthropomorphic phantom.

BUT INTERNAL EXPOSURE cannot be modelled like this

Alpha particle decays- micron diameter particles of Plutonium in a rat lung: ‘alpha stars’ This local high energy effect is called ‘anisotropy’.



The ICRP and ECRR models

- ICRP risk is epidemiologically based on cancer in the Japanese A-Bomb survivors who were exposed to very large EXTERNAL acute doses. The fallout doses were ignored. The cancer risk is assumed to be linear with dose.
- ECRR risk is epidemiologically based on cancer, birth outcomes, and other illness in those exposed to both external and internal doses from fission radionuclides and Uranium, and on the radiochemical and radiobiological effects at the target cellular DNA.

ECRR epidemiological basis

- The ECRR model begins with comparison of cancer in comparable populations differentially exposed to internal radionuclides. Examples include:
- Wales and England and weapons fallout
- Sweden and Chernobyl fallout (Tondel)
- Chernobyl effects on infant leukemia in Europe
- Nuclear site child leukemias (KiKK etc.)
- Coastal Irish Sea Sellafield effects.
- Coastal Nuclear Power Plant effects

The ECRR model

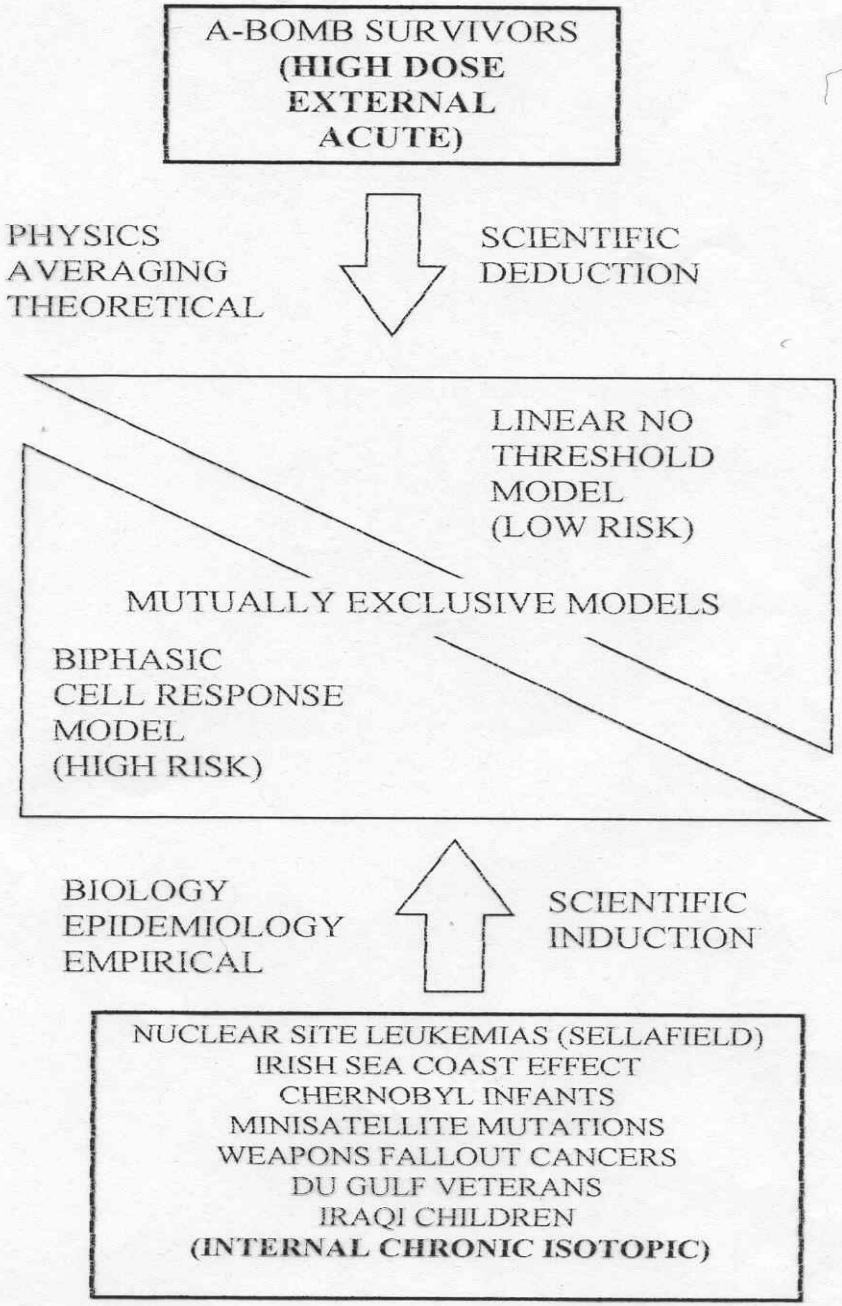
- The result of the epidemiological comparison of populations contaminated with different levels of internal radionuclides is compared with the predictions of the doses calculated by the ICRP method. The result is expressed as an ERROR FACTOR.
- This factor ranges from about 300x to 1000x depending on the study. This then used to develop biophysical and biochemical hazard weighting factors for each radionuclide based on their affinity for DNA and other considerations.

Since 2003 the model is validated

- The ECRR model, presented in 2003, has accurately predicted and explained all observations made since 2003, e.g.
- Increases in cancer in Northern Sweden related to Chernobyl fallout contamination (Tondel et al 2004)
- Increases in ill health in Belarus and other European countries (Okeanov 2004, Busby and Yablokov 2006, Yablokov et al 2009).
- KiKK nuclear site childhood leukemias

The ICRP Hiroshima based model is thus scientifically invalid. In science we test like with like , this is called scientific induction.

We cannot use external risk models to dismiss effects from internal exposures like leukemia in children living near nuclear sites. That is deduction.



Because of this, the ICRP radiation risk model, developed in 1952 and currently still the basis of legal limits has failed the human race and is now manifestly and provably wrong

Theoretically

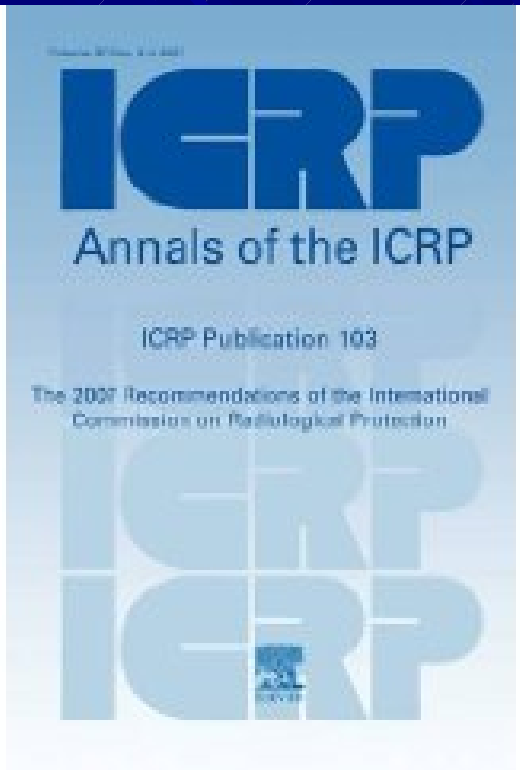
- External and internal isotope or particle doses confer hugely different ionisation density at DNA
- Dose squared
- 2nd Event
- DNA binding; membranes
- Z^4 (high Z elements, uranium)
- Dose response
- Genomic and bystander discoveries

Epidemiologically

- Chernobyl effects
- Chernobyl infants
- Child leukemias (KiKK)
- Nuclear site Downwinders
- Sellafield/ Irish Sea
- Cancer epidemic
- A-Bomb test veterans
- Gulf Vets and Uranium
- Uranium effects
- Cancer in Sweden

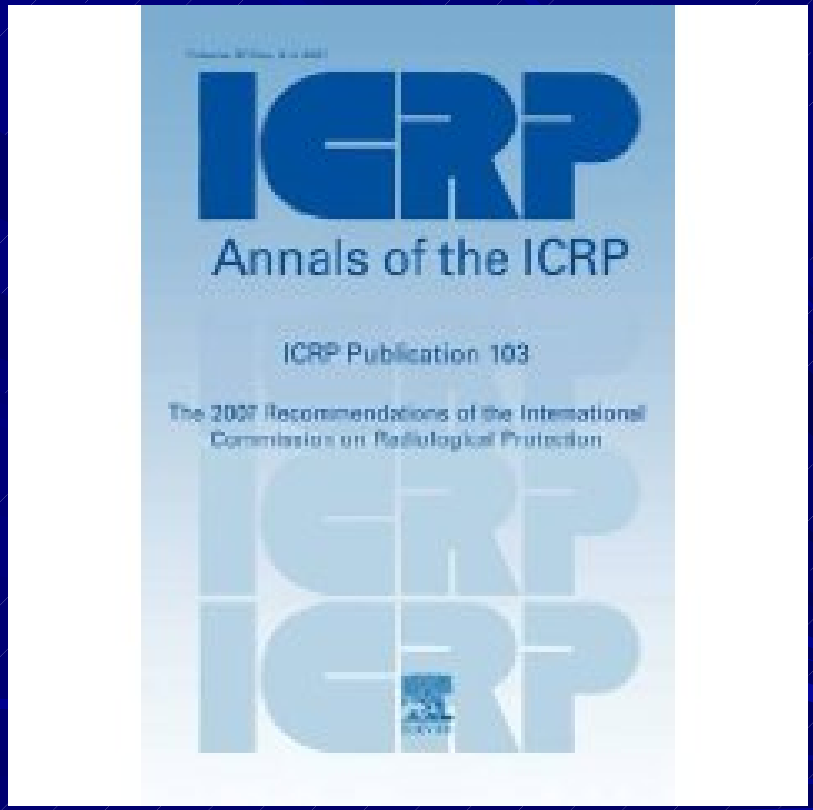
ICRP2007

The most recent version of the ICRP model, Publication No 103 was released in 2007. National Governments are now in the process of adopting the model as a basis for laws on exposure. The new model is the same as The old ICRP 60 1990 model. For 20 years, the ICRP, an independent charity based in the UK, has had one permanent staff member, Dr Jack Valentin.



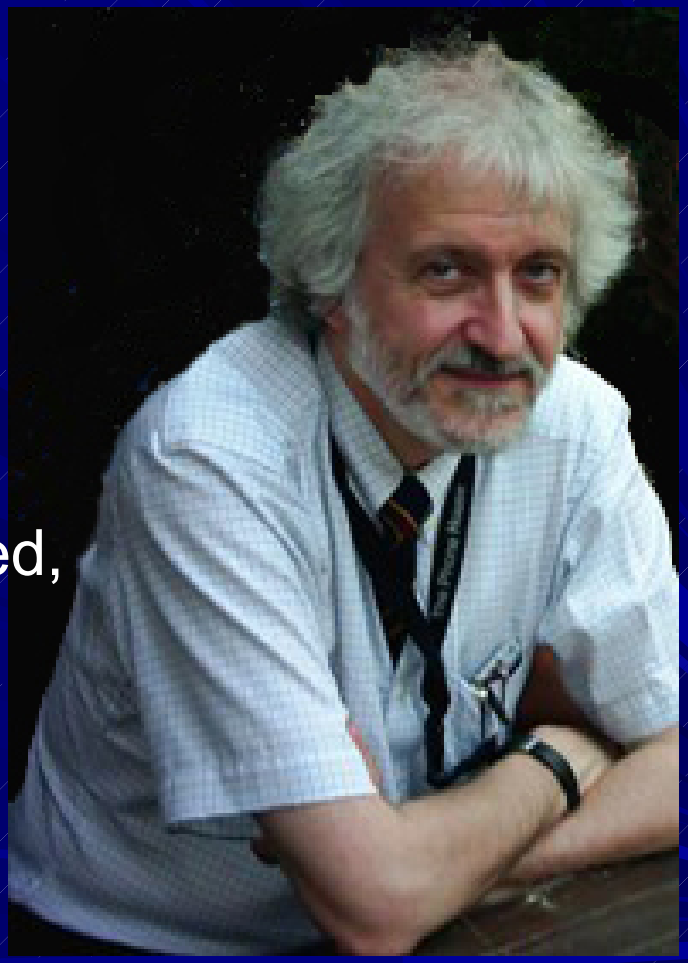
The report barely mentions Chernobyl. It fails to discuss or refer to a large number of peer-reviewed and published reports which show that its conclusions are incorrect.

This situation has now become embarrassing to the scientific community and to the commitment of scientific philosophy to accepting truth from experiment and from observation.



The Scientific Secretary of the ICRP was Dr Jack Valentin until March 2009. He has been the editor of many of the ICRP reports and was editor of the recent 2007 Updated risk model report, ICRP103.

At an open meeting in Stockholm on 22nd April 2009 after he had resigned, there was a discussion between Valentin and Busby about the merits of the ICRP risk model. Jack Valentin made some extraordinary statements.



Dr Jack Valentin said (recorded on videotape):

1. The ICRP risk model could not be used to predict the health effects of radiation exposures in human populations.
2. For certain internal exposures the errors in the model could be as high as two orders (100-999 times)
3. Now that he was no longer employed by ICRP he could agree that the ICRP committee and the United Nations radiation committee (UNSCEAR, whose publications the ICRP model depend on) had been *wrong* in not examining the evidence from the Chernobyl accident, and also much other evidence that showed the ICRP model to be incorrect for internal exposures.

Who is the ECRR? European Committee on Radiation Risk 3rd International Conference on Failures of the IRCP model Lesvos Greece May 5th/6th 2009: Lesvos Declaration

Prof. Chris Busby (University of Ulster) Secretary

Prof. Roza Goncharova (Belarus Academy of Sciences)

Prof Alexey Yablokov (Russian Academy of Sciences)

Prof Shoji Sawada (Nagoya University, Japan)

Prof Inge Schmitz Feuerhake (University of Bremen). Chair

Prof. Daniil Gluzman (Ukraine Academy of Sciences)

Prof Yuri Bandashevsky, Belarus

Dr Paul Dorfman, University of Warwick

Prof Mikhail Malko (Deputy Director, Institute of Power, Belarus)

Prof Angelina Nyagu (Physicians of Chernobyl, Ukraine)

Dr VT Padmanabhan (India)

Dr Andreas Elsaesser (Ulster)

Dr Sebastian Pflugbeil (Germany Institute for Radiation Research)

Dr Alfred Koerblein (Germany)

Prof Elena Burlakova (Institute of Biochemical Physics, Russian Academy of Sciences)

Prof Carmel Mothershill McMaster University, Canada)

The Lesvos statement can be found at www.euradcom.org
The statement includes in the start:

. . . B Whereas the ICRP risk model is used world wide by federal, state and government bodies. . .

. . . C Whereas the Chernobyl accident has provided the most important. . opportunity to discover the yields of serious ill health following exposure to fission products. .

. . . D Whereas, by common consent, the ICRP risk model cannot be validly applied to post accident exposures, nor to incorporated radioactive material resulting in internal exposure

. . . E Whereas the ICRP risk model was developed before the discovery of DNA structure and that certain radionuclides have chemical affinities for DNA . . .

The Lesvos Statement continues:

1. We the undersigned assert that the ICRP risk coefficients are out of date and that (their use) leads to risks being significantly underestimated.
3. Assert that the yield of non-cancer illnesses from radiation . . . is significant. . .
4. Urge the responsible authorities. . . To no longer rely on the existing ICRP model. . .
5. Urge the responsible authorities and all those responsible for causing exposures to adopt a generally precautionary approach and in the absence of another workable model to apply with undue delay the provisional ECRR2003 risk model which more accurately bounds the risks reflected by current observations.

Nuclear atmospheric testing 1952-1963

Weapons tests killed Babies

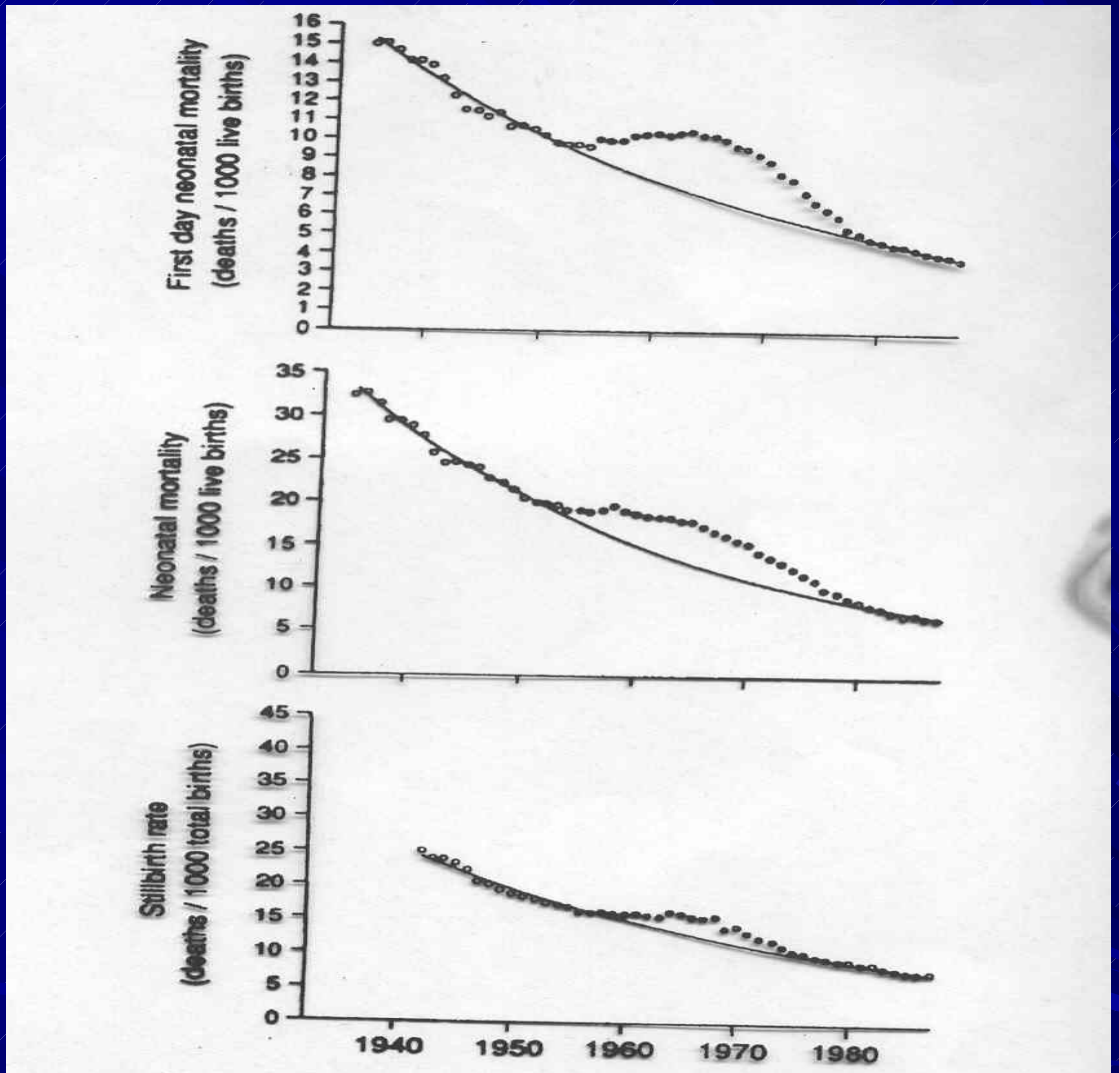


FIG. 7.16. First day mortality, neonatal (0-28days) mortality, and stillbirth rates for the United States. Lines of best fit interpolated from the data for conforming years 1935-54 and 1980-87. Solid circles correspond to deviant years. Source: Whyte, 1992.

Fallout caused childhood leukaemia increases in England and Wales

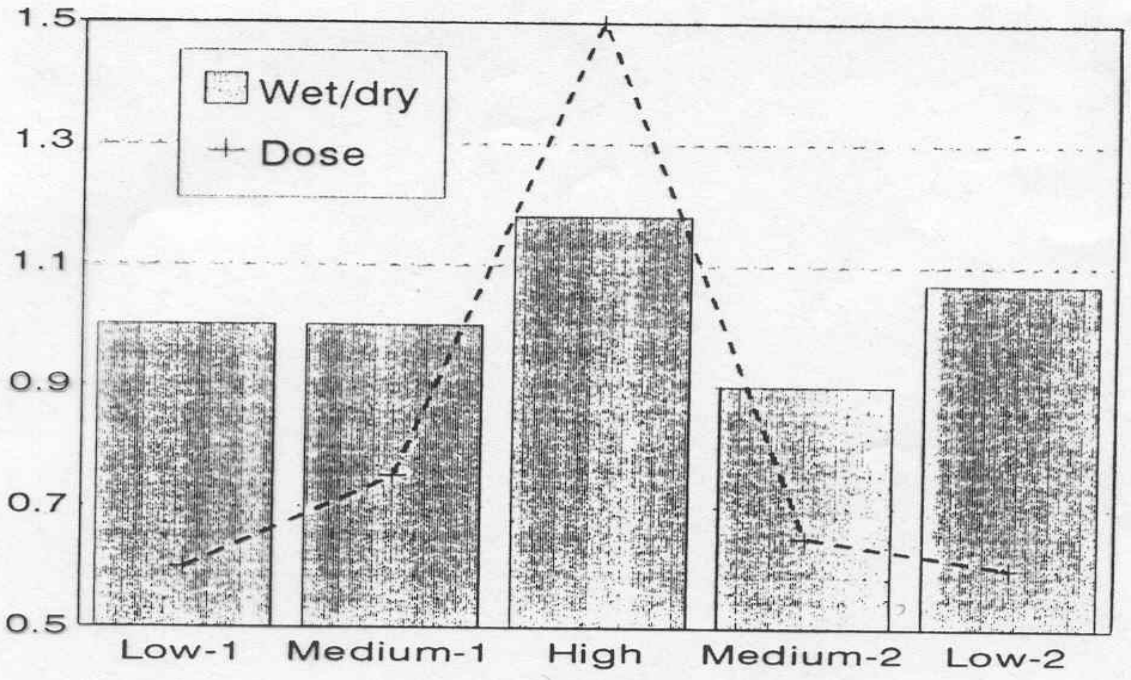
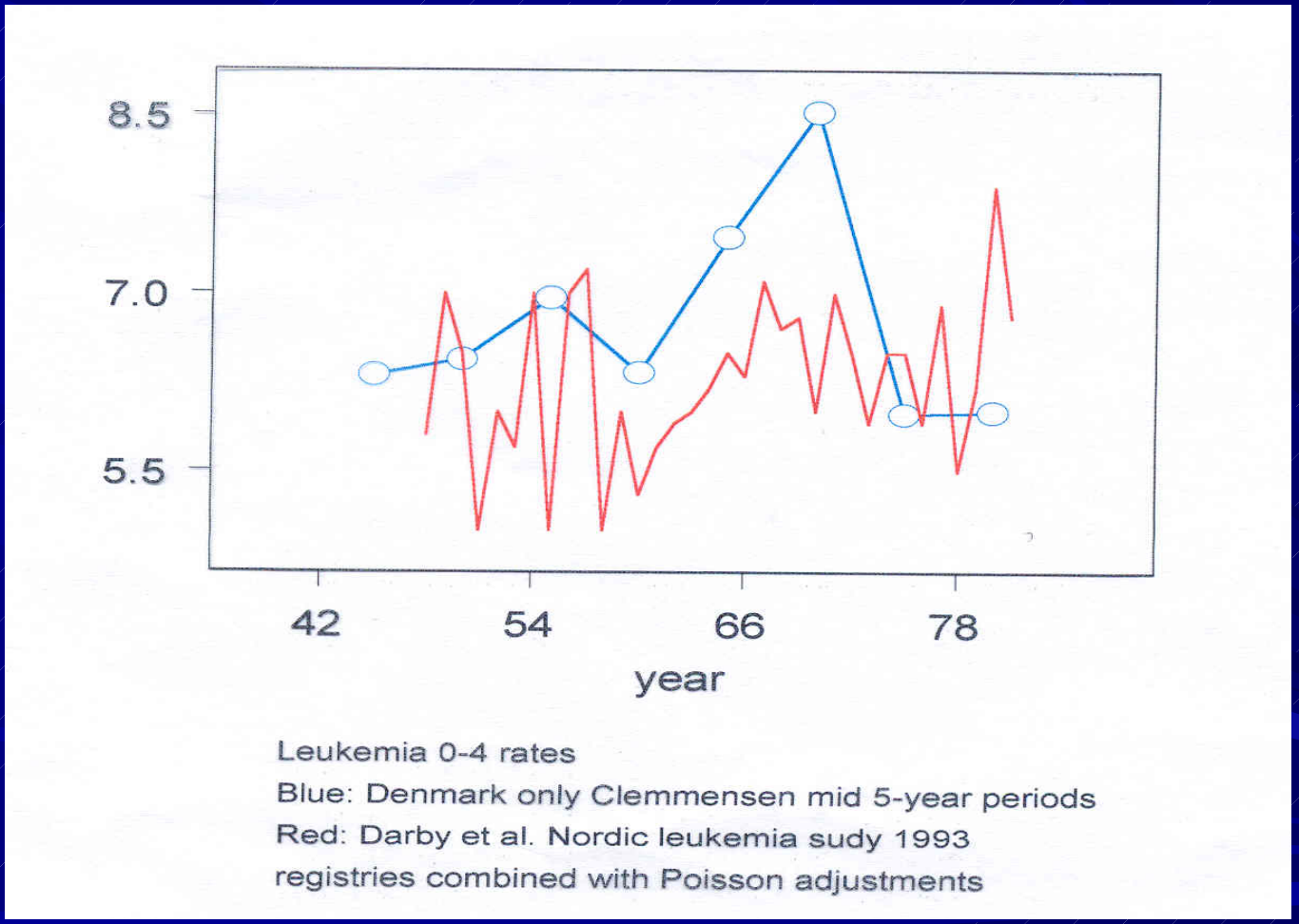


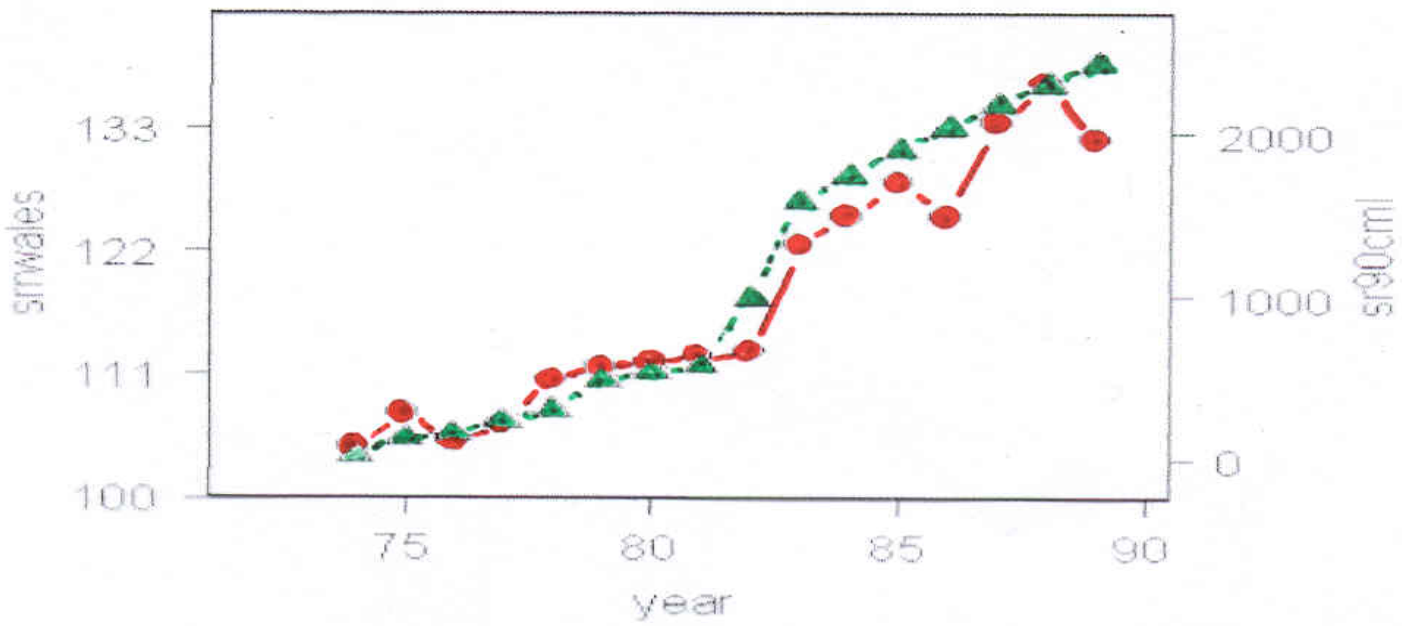
FIG.5.3. Fallout and childhood leukemia age 0-4.
Ratio of death rates for wet/ dry areas of England and Wales normalized to early low fallout period. Also shown (schematically) is the fallout dose trend. (*Source:* Bentham and Haynes ,1995)

And caused child leukemia increases in Denmark, though this was covered up by researchers



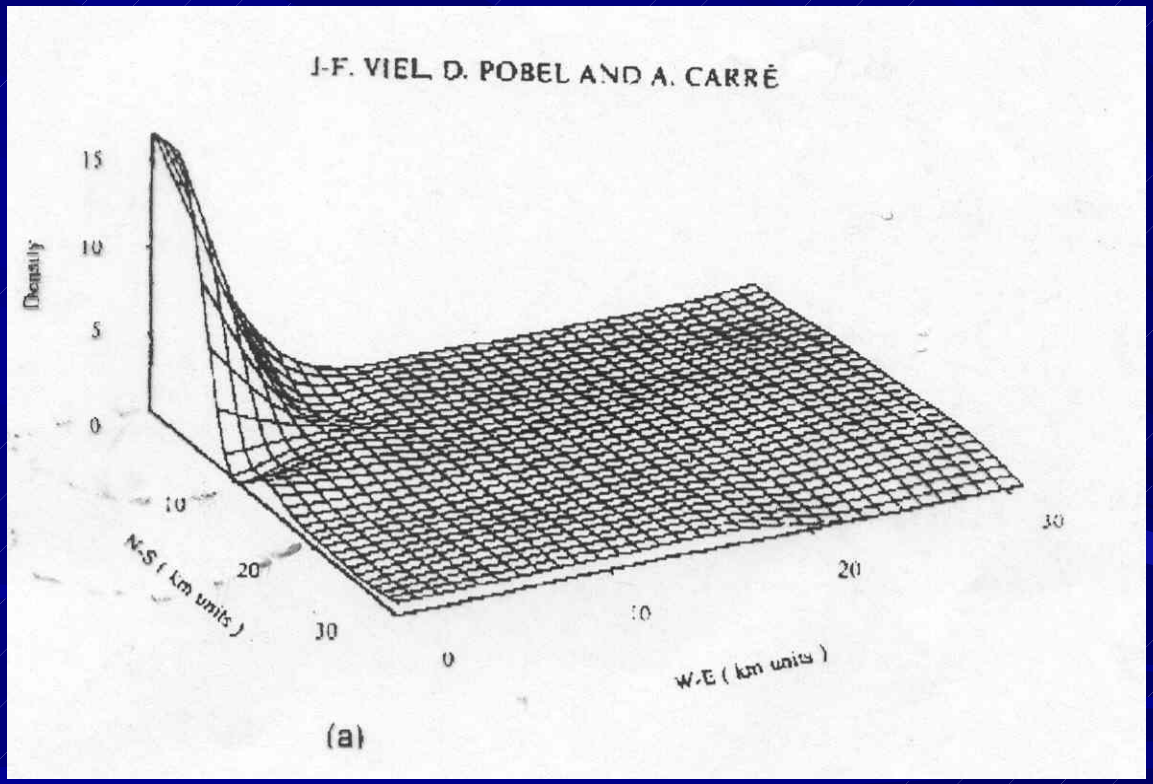
Leukemia 0-4 rates
Blue: Denmark only Clemmensen mid 5-year periods
Red: Darby et al. Nordic leukemia sudy 1993
registries combined with Poisson adjustments

Weapons tests initiated the present cancer epidemic



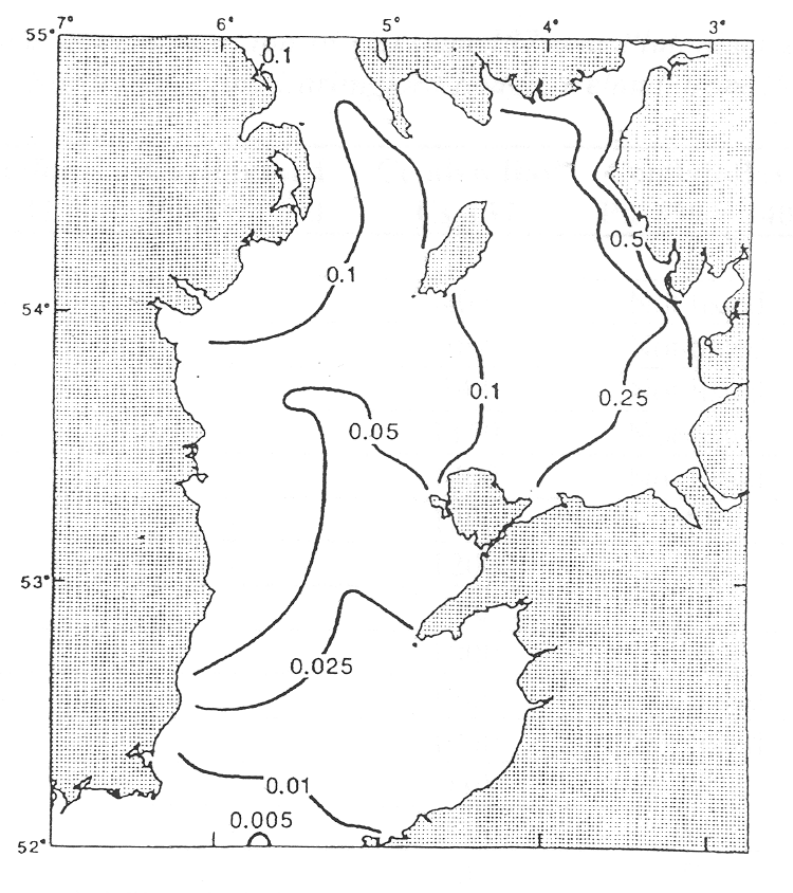
Standardised Incidence Ratio (SIR) all malignancies ● in Wales 1974-1989 (Wales Cancer Registry), circles and cumulative dose (μSv) from Sr-90 1954-79 (▲ ARC Letcombe Research Laboratory, Annual Reports) displaced by 20 years. (Busby 1995)

And releases from reprocessing plants contaminate coastal populations and cause cancer and leukemia. The first such case was at Sellafield where a 10-fold excess still continues. Childhood leukaemia with distance from La Hague.



Since 1997 I have studied Sellafield effects from pollution along the coasts of Ireland and Wales

Sellafield and the Irish Sea



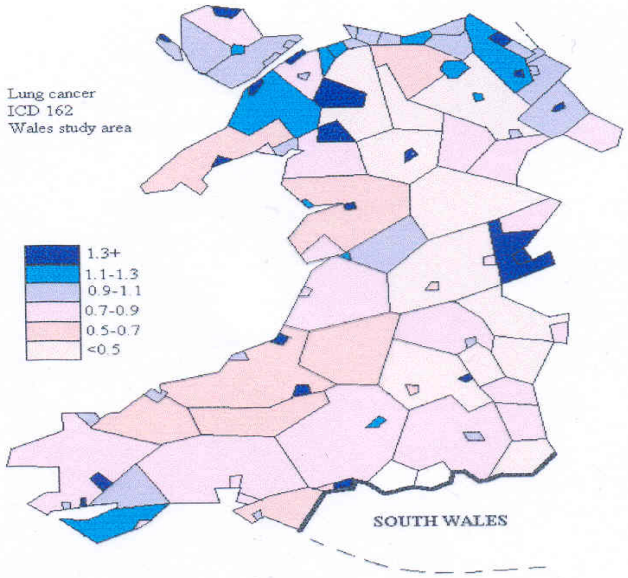
The Irish Sea has restricted and local circulation and is effectively closed at the north entrance. Insoluble material discharged from the Sellafield pipeline becomes attached to sediment and then is redistributed by tidal currents and concentrates in coastal areas where the tidal energy is low. This results in three areas of concentration:

- The coastal areas of Cumbria (e.g. Seascale and coastal villages
- The North Wales Coast (e.g. the Menai Strait, Carnarfon and Bangor)
- North East Ireland (e.g. Dundalk and Carlingford Bay

What all these instances have in common is that the doses are too low to cause the cancers when we use the ICRP model. This is because we are dealing with the internal exposures and ICRP is not valid for internal exposures since it is based on external exposures at Hiroshima.
The error in doing this can be expressed as a ICRP error, based on observed/expected cancer yield. (Internal/External risk). Values range from 100-2000.

Nuclear Site	Year	ICRP error if radiation
Sellafield	1983	300
Dounreay	1986	300-1000
La Hague	1993	300-1000
Aldermaston	1987	300-2000
Hinkley Point	1988	300-2000
Kruemmel,Ge.	1992	100-1000
Julich, Ge.	1996	300-2000
Barsebaeck, Sw,	1998	300-2000

Range of required ICRP model error to account for the results of studies which have established excess leukemia and cancer risk in children living near nuclear sites.

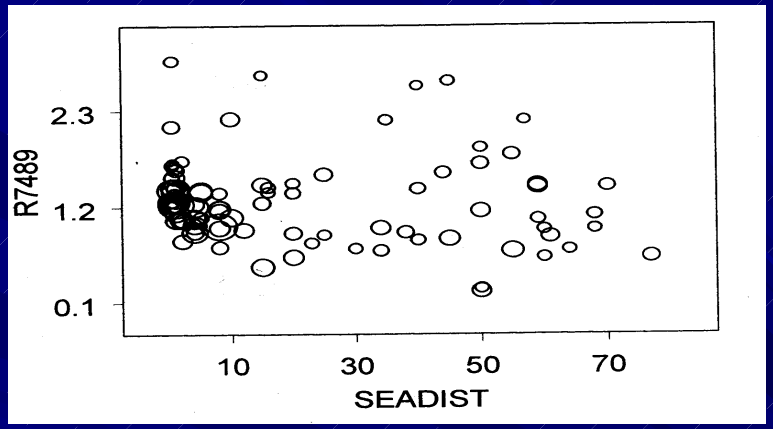


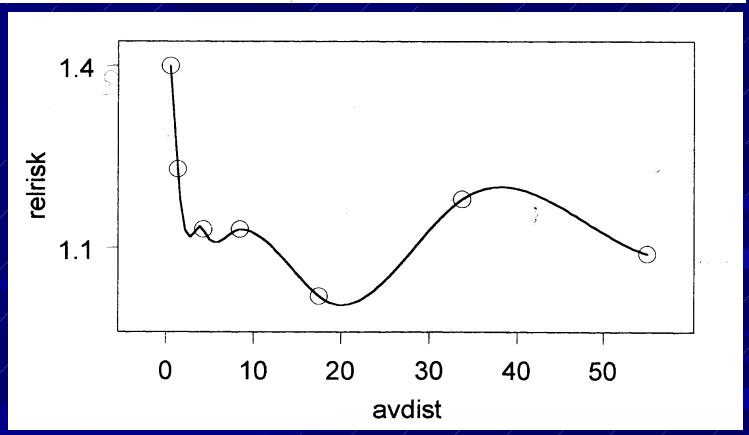
Plutonium and Caesium and other isotopes attach to fine mud in bays and estuaries. This is Carlingford, in County Louth photographed at half-tide. Sellafield isotopes are found here by the Irish Radiological Protection Institute (IRPI). Data from local GP Andy MacDonald analysed by Green Audit in 1998 showed a 4.6-fold excess of child leukemia in the period 1965-85. Ireland had no national cancer registry until 1994.

Results for Adults: Wales 1974-89

Seadist range Km	Average (SD)	N AORs	Oberved 74-89	Expected 74-89	Relative Risk	P value
<0.8	0.56 (0.17)	17	14445	10419	1.4	0.0000
0.9<x<2	1.38 (0.51)	13	11714	9559	1.23	0.0000
2.1<x<5	4.27 (0.47)	10	8283	7290	1.13	
5.1<x<11	8.44 (0.88)	10	8358	7388	1.13	
11.1<x<20	17.5 (2.32)	12	4294	4231	1.02	
21<x<40	33.67 (6.5)	12	2995	2524	1.18	
>41	55 (9.5)	23	7153	6579	1.09	
S Wales E=2		65	125054	105201	1.13	
Wales		193	207272	174675	1.12	

This shows results for all malignancy all adults 1974-89. The details for the AOR bands are given in the table above. Top right is a bubble plot of the individual RRs, radius weighted for expectation by distance from the sea. Bottom right shows a LOESS plot of the risks in the AOR bands. Note the sharp increase in risk in the 1km strip. This is a common feature of the results for adults and children.





Childhood cancer in Wales by distance from Irish Sea (km)

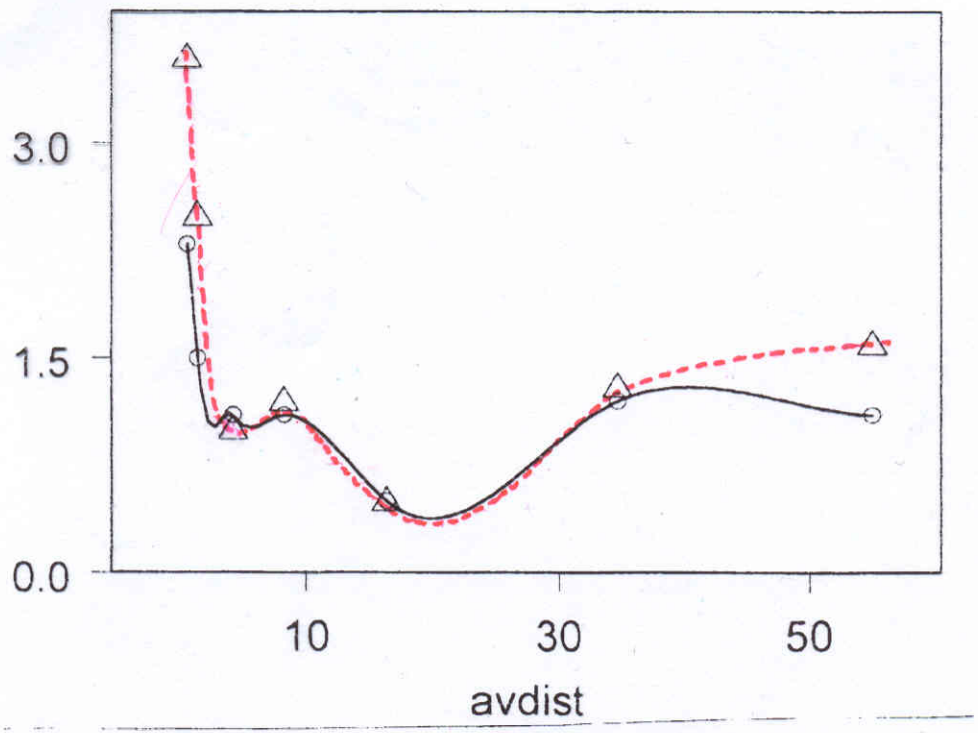
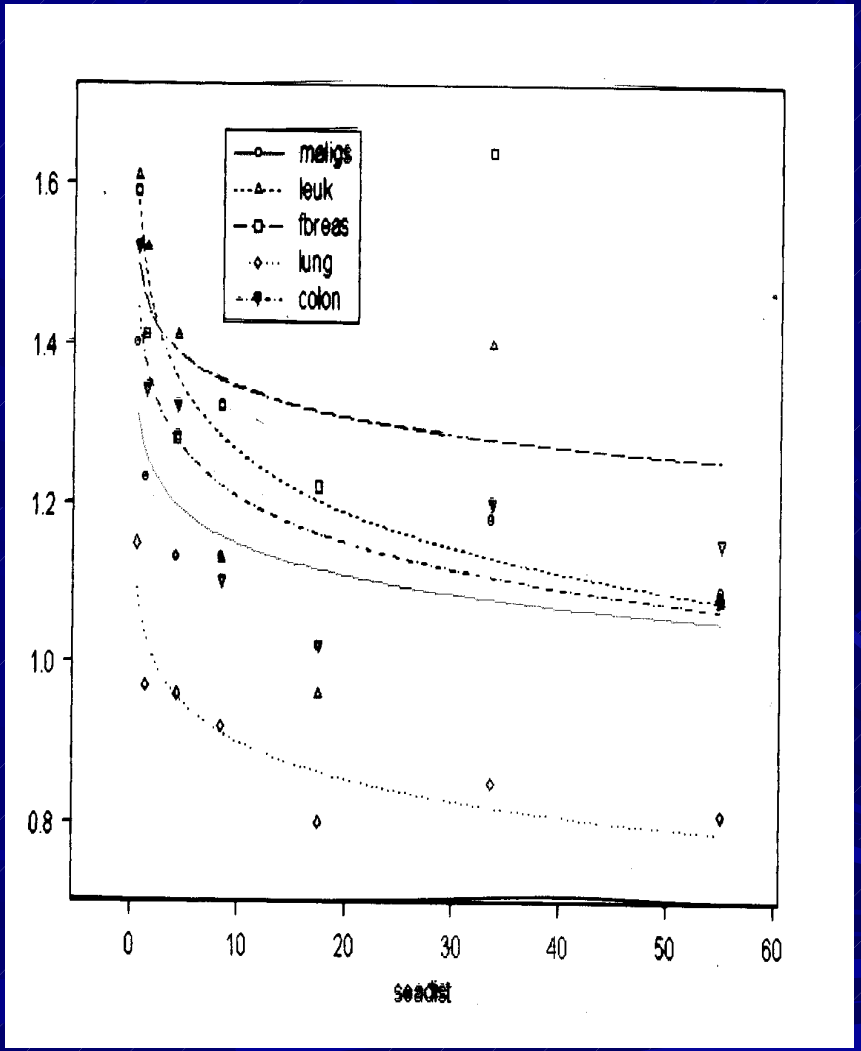


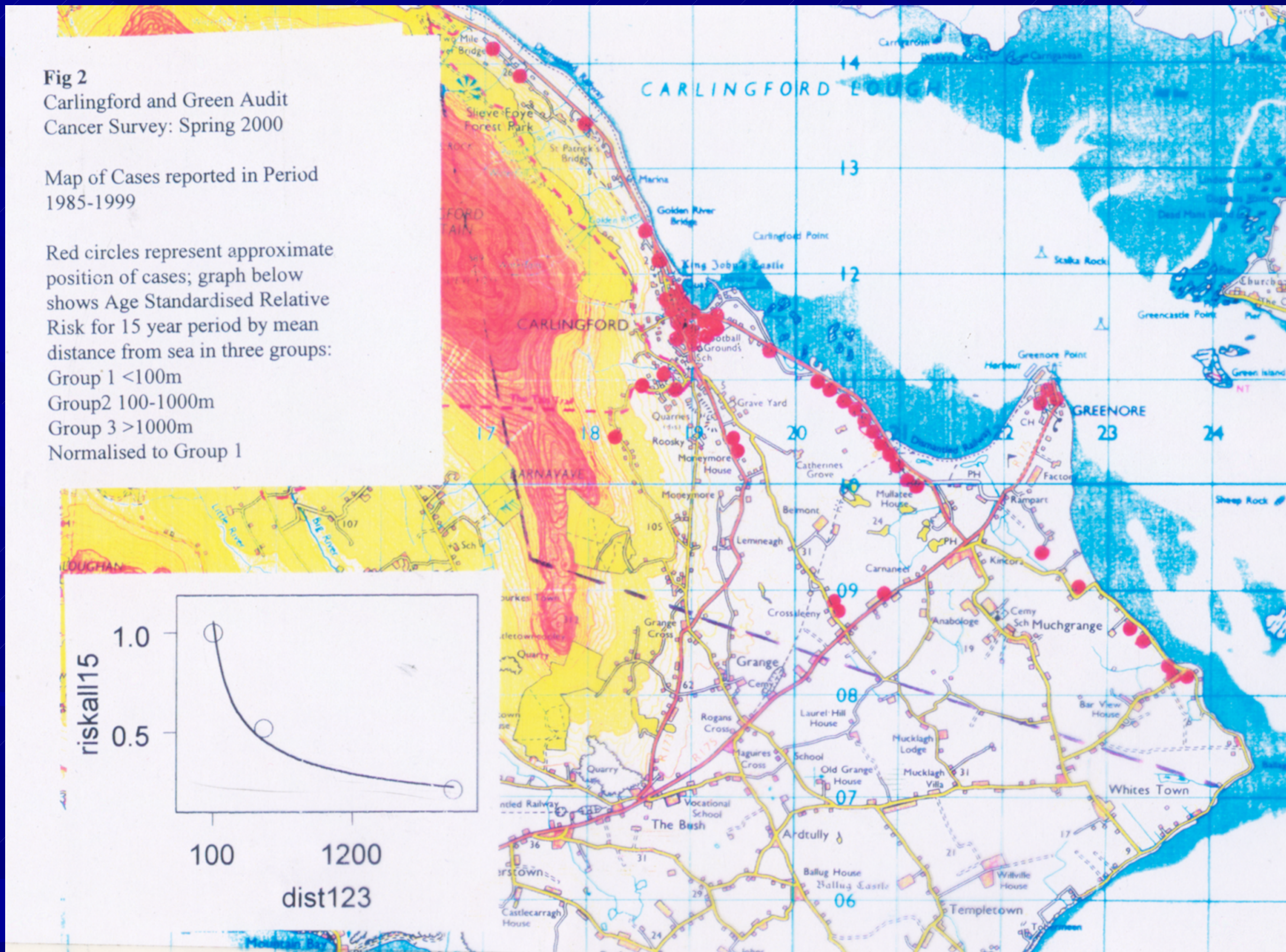
Fig 7. Childhood cancer in Wales 1974-89. Relative Risk trends 0-4 age group (177 cases) aggregated into AORs by distance from Irish sea . (Circles and line 1974-89, triangles 1984-88).

The sea coast effect was seen in most of the main cancer sites in adults and was much greater in children

- The graph shows an exponential fit to data points for RR in the AOR bands for all malignancy, leukemia, female breast cancer, lung and colon cancer in adults. For all of these the regression of SEADIST (distance from the sea) on log(RR) was statistically significant at $p<0.05$ level.
- The effect was driven by high risks in towns on the North Wales coast near known areas of radioactive pollution in the intertidal sediment.



Results of STAD/ Green Audit questionnaire study in Carlingford and Greenore, Ireland, 2000;
red dots are cancer cases; blue region is contaminated mud.



Irish Sea Radioactive particles

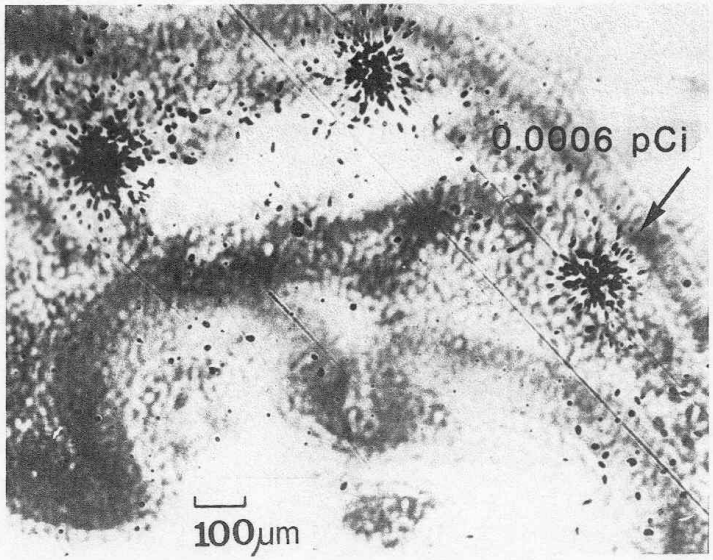


Fig. 1. *Mytilus edulis*. Thin section across the lumen of the intestine of Ravenglass individuals, illustrating the presence of hot particles recorded in CR39 detector superimposed upon the section. Exposure period 166 d

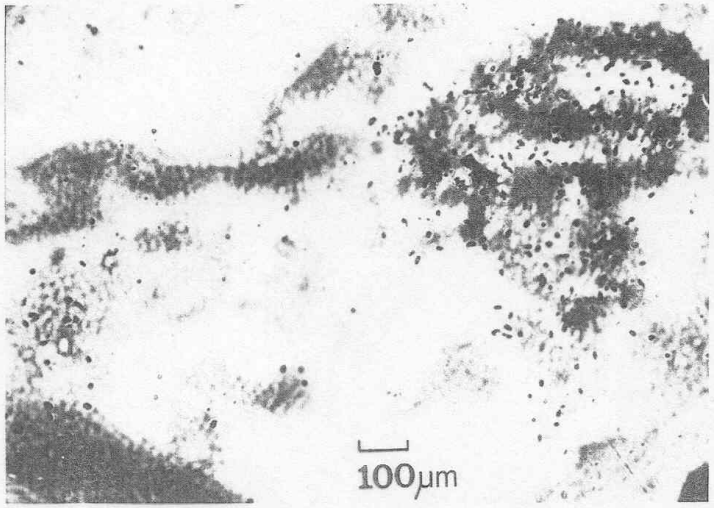
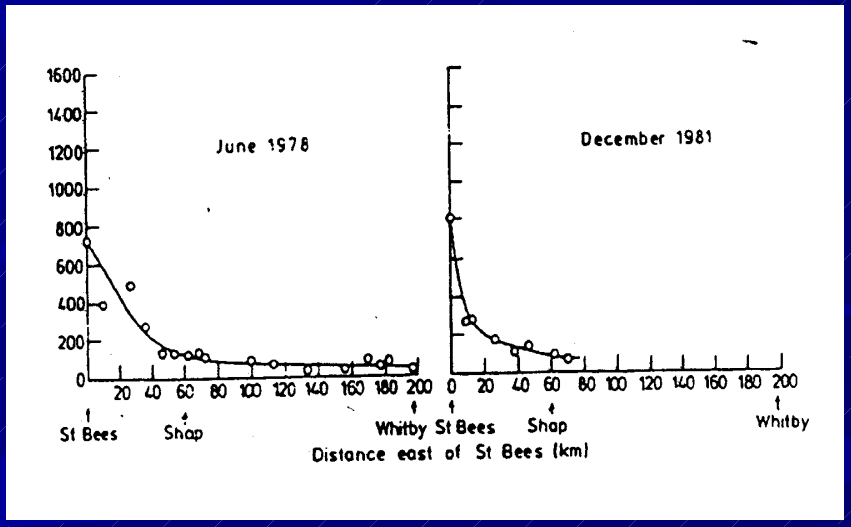
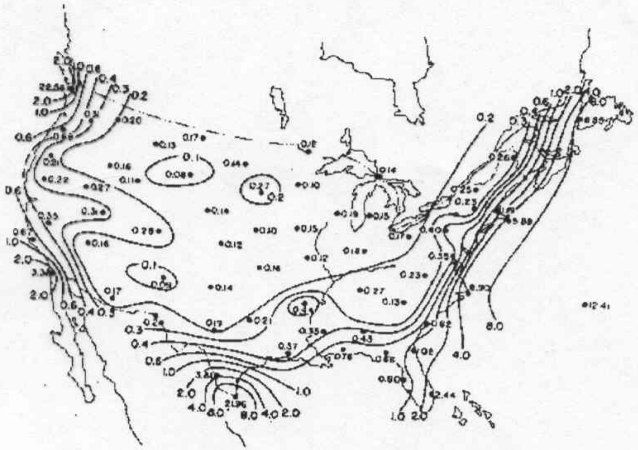


Fig. 2. *Mytilus edulis*. Distribution of α activity in a transverse kidney section of Ravenglass individuals, illustrating localised enriched levels of activity. Exposure period 166 d. Procedures as in Figure 1

Penetration of Plutonium inland follows penetration of sea derived particles, mainly sodium chloride.

In USA the map opposite shows this (Junge 1963). Below, concentration of Pu-239 in sheep faeces across UK on West East transect from Sellafield. Bottom right, the formation of the ejected particle from seaspray.





Penetration of seaspray inland in the USA
Ocean derived Chloride ion concentration
from Junge 1961

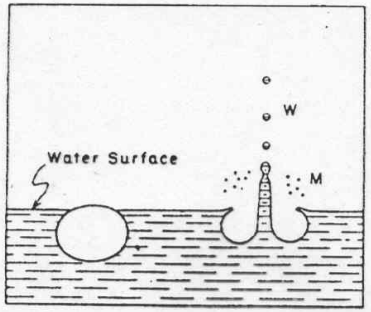
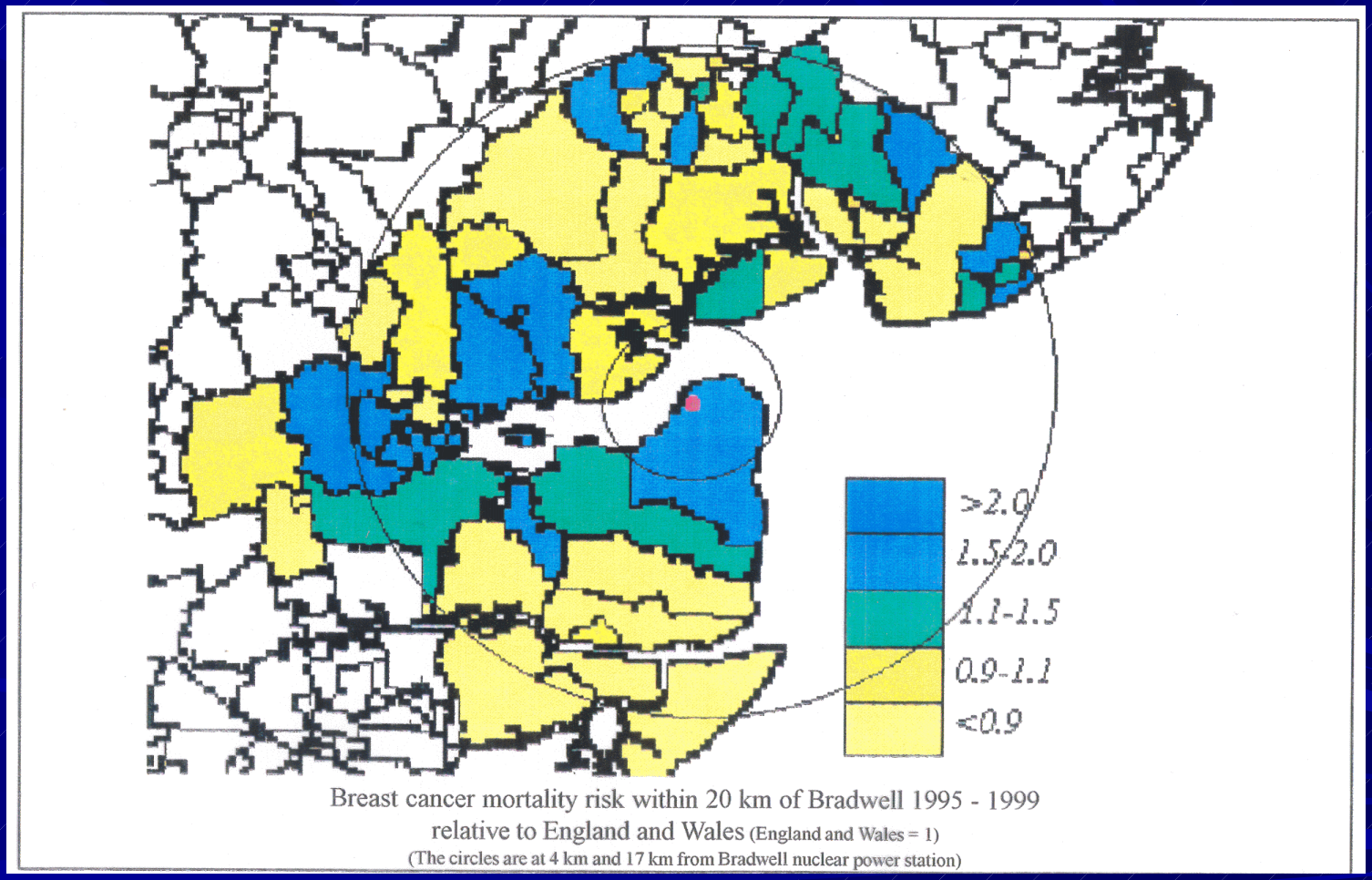


FIG. 34. The formation of sea-salt particles from the bursting of bubbles. The large droplets *W* originate upon disintegration of the jet and have been studied by Woodcock and his associates (Kientzler *et al.* 1954). More numerous and smaller particles *M* can form from the bursting of the bubble film (Mason, 1954).

Breast cancer mortality in wards near contaminated mud near Bradwell NPP, Essex, UK



Breast cancer mortality risk within 20 km of Bradwell 1995 - 1999
relative to England and Wales (England and Wales = 1)
(The circles are at 4 km and 17 km from Bradwell nuclear power station)

Infant leukemia. Unequivocal proof of error of 100-500 in ICRP internal risk model; published in peer review and presented at WHO conference in KIEV 2000.

Increases in leukemia in infants in Wales and Scotland following Chernobyl: Evidence for errors in statutory risk estimates and dose-response assumptions.

Paper presented at the 3rd International Conference
HEALTH EFFECTS OF THE CHERNOBYL ACCIDENT:
RESULTS OF 15-YEAR FOLLOW-UP STUDIES
Organised by Physicians of Chernobyl/ World Health Organisation
Kiev, Ukraine June 4-8

Chris Busby, PhD
Molly Scott Cato, MA, MSc, PhD

- Increase in infant leukemia in 5 countries in Europe in the children who were in the womb at the time of the fallout. Defines error of 100-fold to 500-fold.
- Covered up by IARC, Lyon (WHO) as part of their Chernobyl cover up.

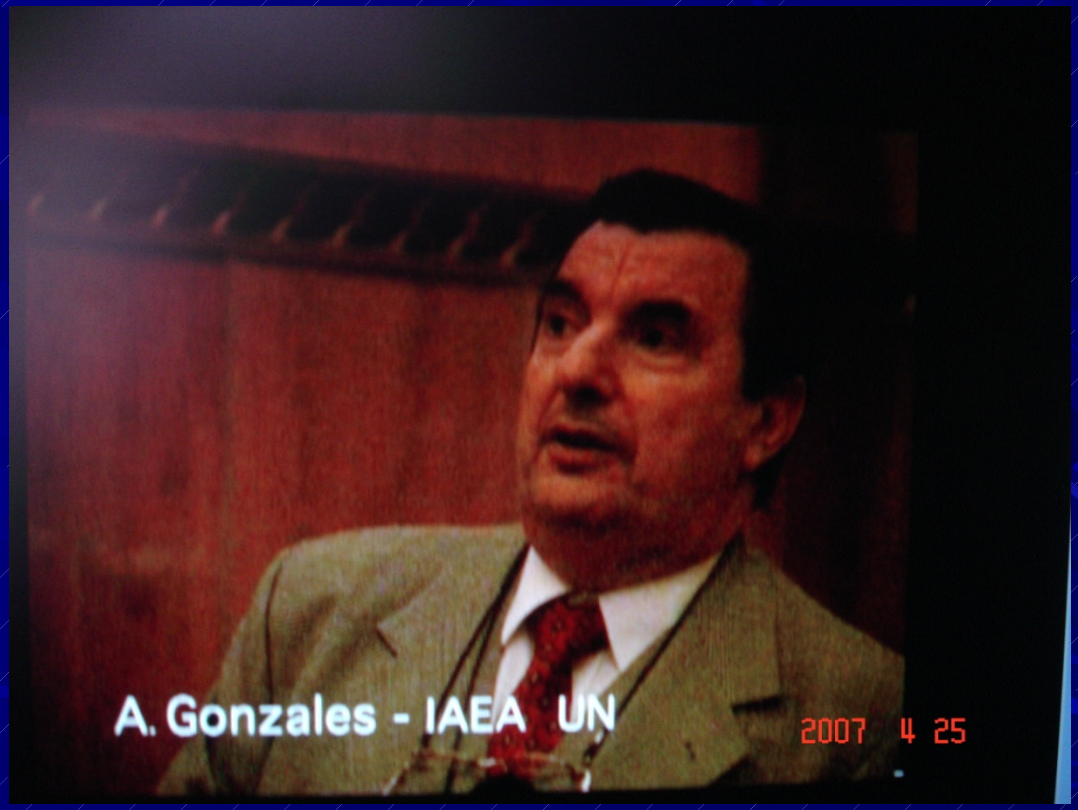
Table 2
Infant leukemia (ages 0-1) in Scotland and Wales and both countries combined
(Source: Wales Cancer Intelligence Unit, Scottish Health Services)

Year	Scotland	Wales	Both	2-year groups
1975	1	0	1	
1976	3	0	3	4
1977	1	2	3	
1978	2	0	2	5
1979	0	0	0	
1980	2	0	2	2
1981	4	0	4	
1982	0	1	1	5
1983	1	0	1	
1984	3	0	3	4
1985	1	1	2	
1986	0	1	1	3
1987	6	0	6	
1988	4	4	8	14
1989	2	1	3	
1990	2	1	3	6
1991	0	1	1	
1992	3	2	5	6
1993	3	1	4	
1994	1	0	1	5

Note: In the period 1st Jan 1987 to 30th June 1988 there were 3 cases in Wales and 9 in Scotland

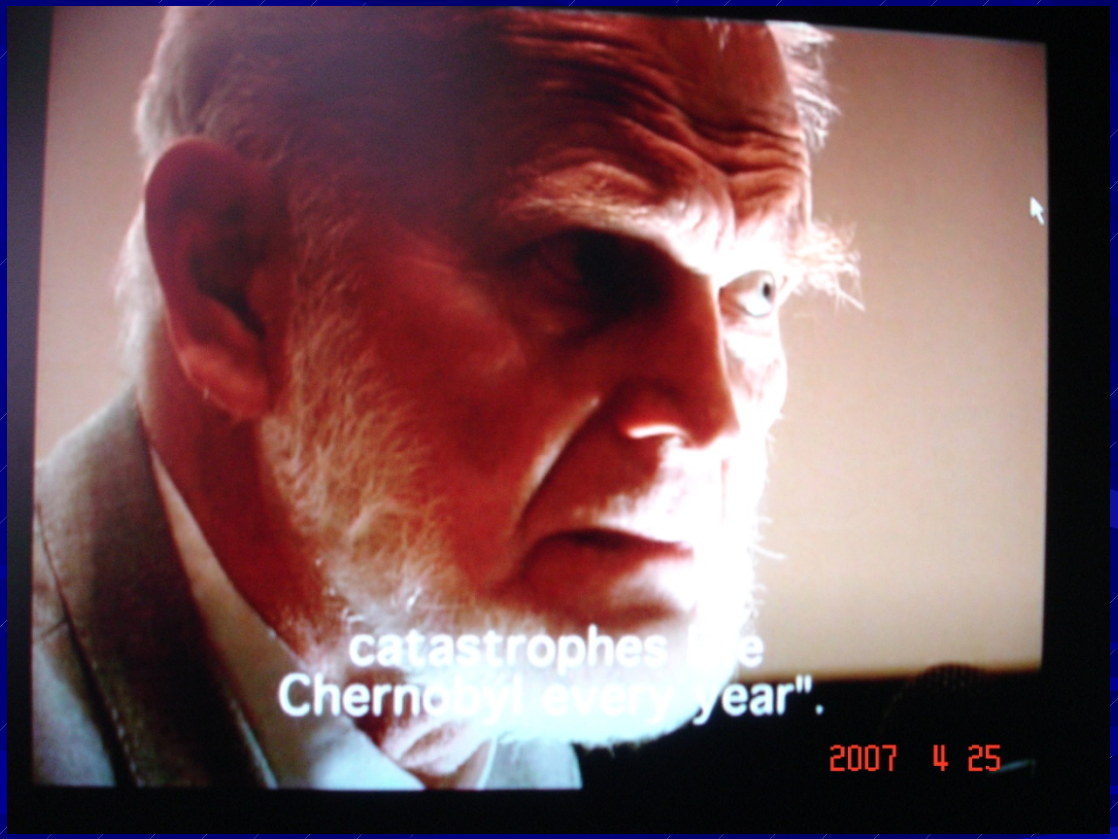
CHERNOBYL: By 2000, when the United Nations report on Chernobyl was published there were several different estimates of the health consequences.

- The IAEA and UN stated that there were 31 deaths in the liquidators and 2000 thyroid cancers in children. No other ‘scientifically provable effects’.

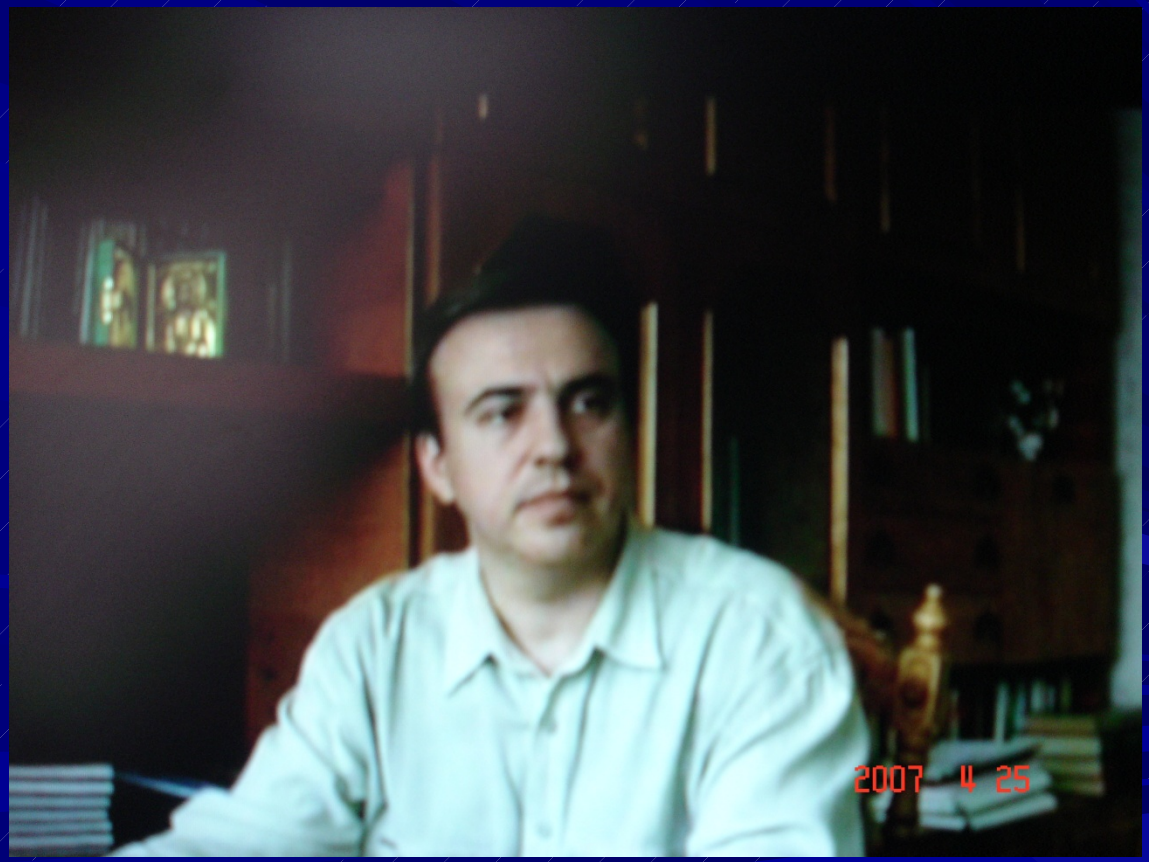


Chernobyl: the position that the death yield of the accident was restricted to a few cleanup workers was also the position of Lars-Erik Holm, Chairman of ICRP until recently, when he was made Medical Officer of Health for Sweden, a worrying conflict of interest!

Prof. Alexey Yablokov (Russian Academy of Sciences records that members of the Soviet statistical ministry were arrested for falsifying health results relating to Chernobyl effects. Yablokov's new book on Chernobyl effects if published by the New York Academy of Sciences in 2009.

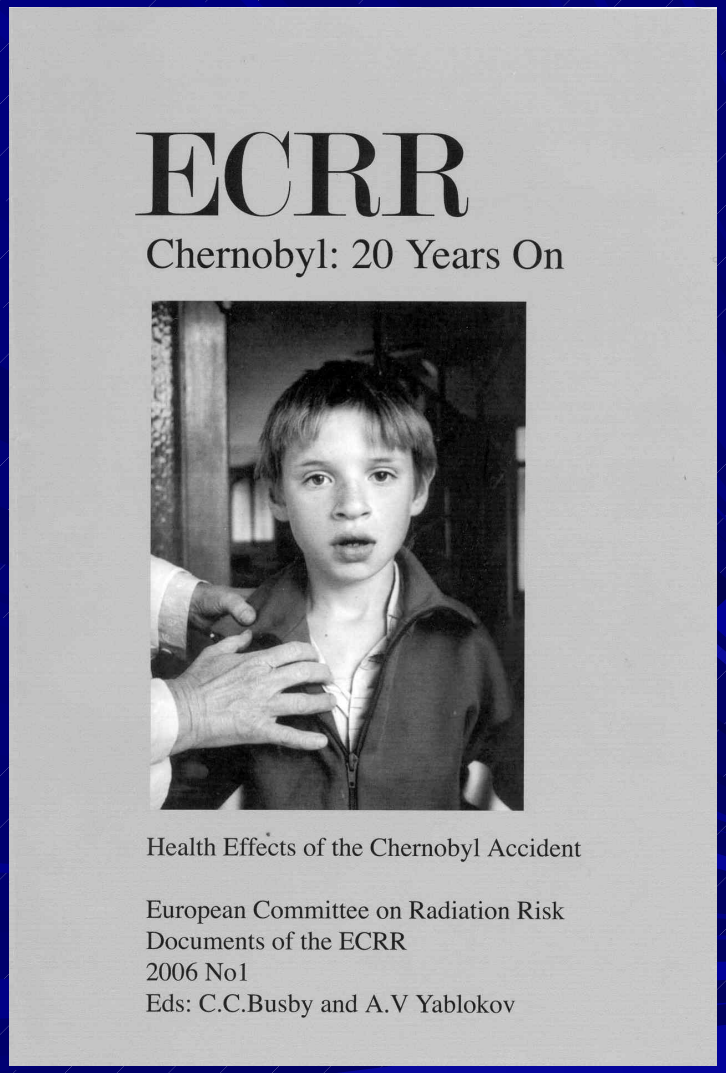


In Belarus, the effects of the internal contamination by Cs-137 resulted in heart attacks in children, correlated with the whole body measurements. When Prof Yuri Bandashevsky reported this and leaked it to the west, he was arrested and given 9 years hard labour.



Chernobyl

The latest report from the ICRP ignores Chernobyl. The establishment says that Chernobyl affected areas are not measurable; that there has been no cancer increase nor any other effect from the exposures; that all the serious changes in the health of the population are due to social changes and ‘radiophobia’.
This ECRR book is now reprinted in a 2nd Edition. It has reviews of all the Russian language peer reviewed literature on the health effects.



Cancer in Sweden after Chernobyl

In 2004 Martin Tondel published a study of cancer in Northern Sweden after Chernobyl.

He found a correlation between cancer incidence and levels of Chernobyl fallout based on Caesium-137 contamination: an 11% increase in cancer per 100kBq/square metre contamination

This translates into an error in the ICRP risk model of 600-fold or more, predicted by the ECRR risk model.

Tondel et al 2004

RESEARCH REPORT

Increase of regional total cancer incidence in north Sweden due to the Chernobyl accident?

Martin Tondel, Peter Hjalmarsson, Lennart Hardell, Göran Carlsson, Olav Axelson

J Epidemiol Community Health 2004;**58**:1011–1016. doi: 10.1136/jech.2003.017988

See end of article for authors' affiliations

Correspondence to: Dr M Tondel, Division of Occupational and Environmental Medicine, Department of Molecular and Clinical Medicine, Faculty of Health Sciences, Linköping University, 581 85 Linköping, Sweden; Martin.Tondel@lio.se

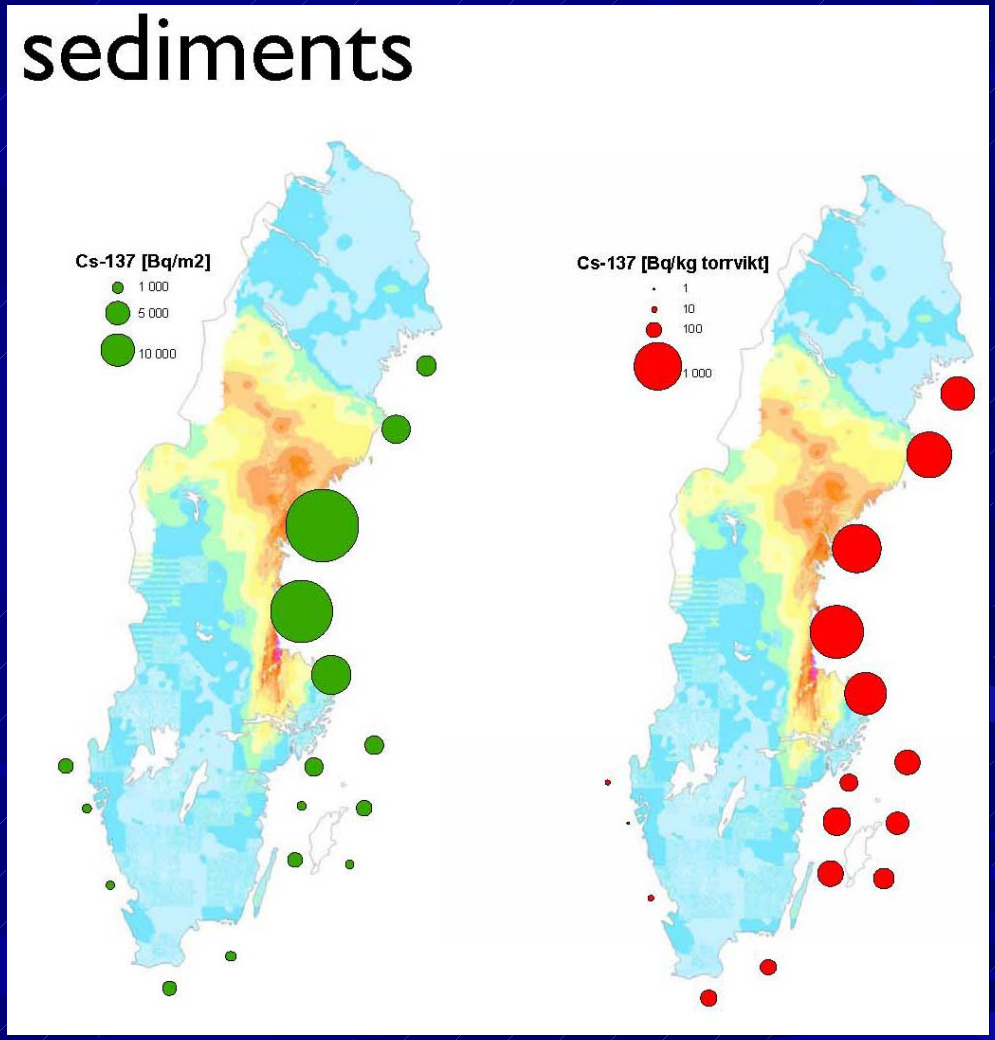
Accepted for publication 24 February 2004

Study objective: Is there any epidemiologically visible influence on the cancer incidence after the Chernobyl fallout in Sweden?
Design: A cohort study was focused on the fallout of caesium-137 in relation to cancer incidence 1988–1996.
Setting: In northern Sweden, affected by the Chernobyl accident in 1986, 450 parishes were categorised by caesium-137 deposition: <3 (reference), 3–29, 30–39, 40–59, 60–79, and 80–120 kiloBecquerel/m^2.
Participants: All people 0–60 years living in these parishes in 1986 to 1987 were identified and enrolled in a cohort of 1 143 182 persons. In the follow up 22 409 incident cancer cases were retrieved in 1988–1996. A further analysis focused on the secular trend.
Main results: Taking age and population density as confounding factors, and lung cancer incidence in 1988–1996 and total cancer incidence in 1986–1987 by municipality as proxy confounders for smoking and time trends, respectively, the adjusted relative risks for the deposition categories were 1.00 (reference <3 kiloBecquerel/m^2), 1.05, 1.03, 1.08, 1.10, and 1.21. The excess relative risk was 0.11 per 100 kiloBecquerel/m^2 (95% CI 0.03 to 0.20). Considering the secular trend, directly age standardised cancer incidence rate differences per 100 000 person years between 1988 to 1996 and the reference period 1986–1987, were 30.3 (indicating a time trend in the reference category), 36.8, 42.0, 45.8, 50.1, and 56.4. No clear excess occurred for leukaemia or thyroid cancer.
Conclusions: Unless attributable to chance or remaining uncontrolled confounding, a slight exposure related increase in total cancer incidence has occurred in northern Sweden after the Chernobyl accident.

The Baltic Sea is now the most radioactively contaminated in the world according to official measurements (HELCOM)

- It is 50 times more contaminated than the Irish Sea was at the time of the studies showing a 40% increase in cancer in coastal communities
- The cause is the build up of radioactive fallout from weapons tests and from Chernobyl. Sediment contains 1000Bq/Kg Cs-137
- ECRR, Baltic Sea Regional Office proposes a radiation and cancer study of coastal populations in Sweden, Finland, Denmark, Latvia and Germany and is seeking funding

Caesium-137 in Baltic Marine sediments HELCOM 2009



Breast cancer incidence as an indicator of internal fission-product exposure

- Tondel et al 2004 correlated cancer rates with Caesium-137 deposition after Chernobyl. But the radionuclides will have quickly washed to the sea to contaminate sediment and expose people through inhalation, as with the Irish Sea coastal populations.
- ECRR Baltic proposes looking at changes in cancer rates before and after Chernobyl in inland and coastal wards. The effect is clear in the Swedish Counties from published data.

Sweden standardised Breast Cancer rates/10^5

County	84	85	mean	88	89	90	91	mean	%Δ
BALTIC									
Stockholm	110	118	114	119	124	141	141	131	+15
Blekinge	87	117	103	131	120	145	131	132	+28
Kalmar	103	103	103	130	107	103	107	112	+9
Uppsala	106	114	110	112	119	142	125	125	+13
Gavleborgs	81	79	80	80	86	100	101	92	+15
VasterN	102	96	99	86	99	142	134	115	+16
Skane	106	114	110	112	119	142	125	125	+13
Hallands	92	106	99	98	130	141	104	118	+19
VasterG	104	105	105	116	123	133	133	126	+21
INLAND									
Varmlands	90	96	93	82	99	87	103	93	0
Dalarnas	113	114	114	93	115	95	100	101	-11
Jamtlands	103	119	111	98	77	79	106	90	-19

Martin Tondel, who should have been celebrated, is no longer working on radiation

Tondel et al's 2004 study was violently attacked by the authorities. It was stated that he had not taken into consideration the "known cancer effects of radiation" and that his findings were therefore impossible.

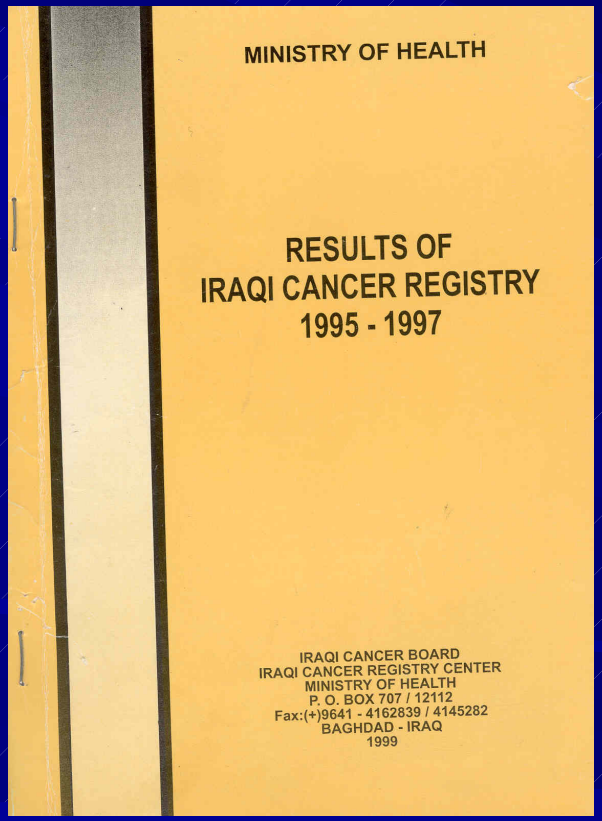
His new boss, and the lead person in dismissing his important results was Lars-Erik Holm, previously Director of SSI, Chair of ICRP, consultant to UNSCEAR and the IAEA and now Medical Officer of Health, Socialstyrelsen, Sweden !!

Depleted Uranium weapons

Depleted Uranium

- Natural Uranium (as mined) contains a very small amount of the isotope U-235 which is used in nuclear reactors and for making bombs. After this is removed, the **waste** Uranium-238 is called **Depleted Uranium**.
- Depleted Uranium is a radioactive silvery white very dense metal which rapidly tarnishes in air to a dull yellowish grey colour. U-238 radioactivity as mainly alpha with a half life of 4 billion years but as it always occurs in the presence of the beta emitting daughter isotopes Th-234 and Pa-234m, (and as DU with some U-234) there are also two beta decays and some gamma decays. The specific activity is 36 million decays per second per kilogram. It is not therefore safe to handle and will burn the skin. It is twice as ‘heavy’ as lead.

Battle Tank warfare was changed forever
There was a sharp rise in cancer and birth defects in Iraq, Afghanistan, and Balkans
Veterans developed ‘Gulf War’ illness, their children where born with defects. Cover up by WHO, military, Royal Society et al. on basis of doses and ICRP external model.



DU stays around a long time:
I have measured it in Iraq 9 years after it was used.

And in Kosovo in 2001. In both areas it was resuspended in sunlight and existed in the air as a kind of aerosol, a gas made up of sub-micron particles. (Nippon TV)

Theoretical falsification of the ICRP model. Uranium and Z^5

I will present one area where the ICRP model entirely fails; the assessment of radiation risk from Uranium due to secondary photoelectrons

- Since 2002 I have been drawing attention to the Photoelectric Enhancement (PE) of natural background radiation by elements of high atomic number Z. Uranium has the highest atomic number (Z=92) for all naturally occurring elements.

Fact (1) : Absorption of gamma and X-radiation is proportional to the fourth (some say 5^{th}) power of the atomic number Z

Material	Z	Z^4	$H_2O = 1$
H_2O	3.33	123	1.0
DNAP	5.5	915	7.4
Ca	20	0.15E6	1220
Sr	38	2.1E6	17,073
Ba	56	9.8E6	79,675
Au	79	38E6	308,943
U	92	72E6	585,365

And Fact (2): Uranium, as UO_2^{++} (uranyl) binds strongly to DNAP

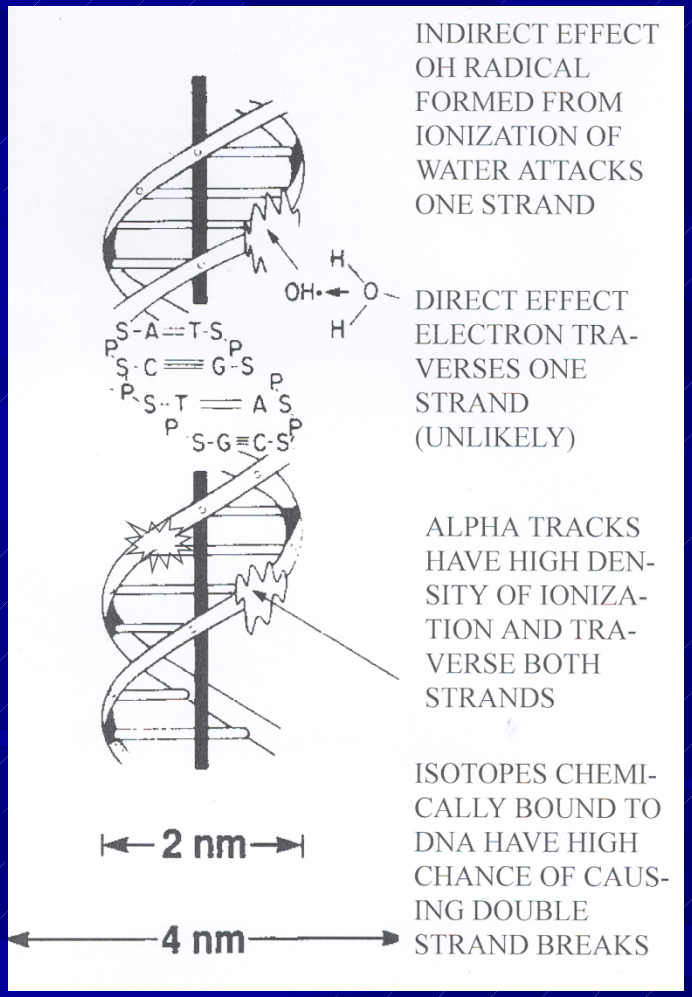
- The affinity constant is $10^{10}M^{-1}$ measured by Nielsen et al (1992)
- This means that at a concentration of

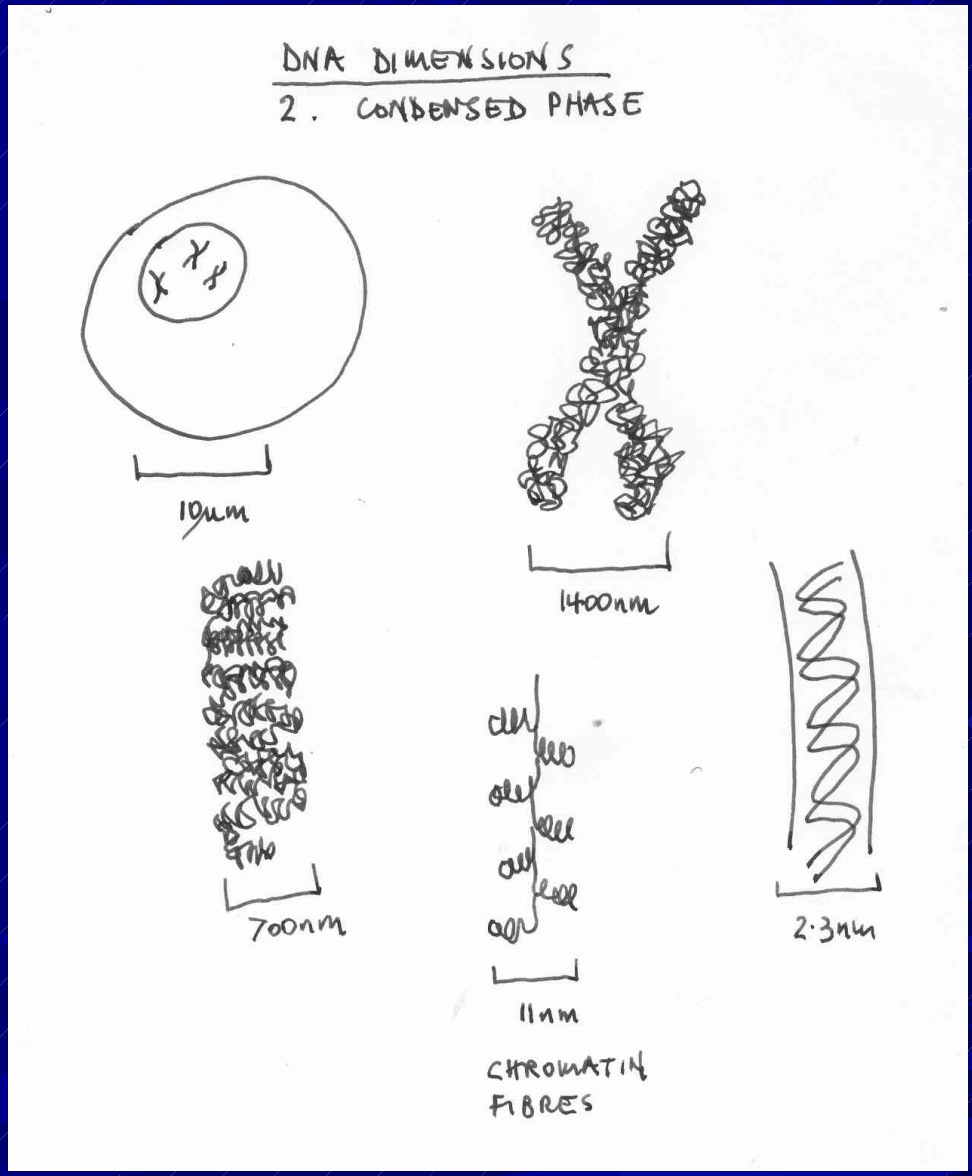
10^{-10}M (23.6ng/l) the DNAP will be half-saturated at a stoichiometry of 1 mole uranium to 2 moles PO_4^{--} .

The affinity for DNAP was first pointed out in 1961 when it began to be used as an electron microscope stain:

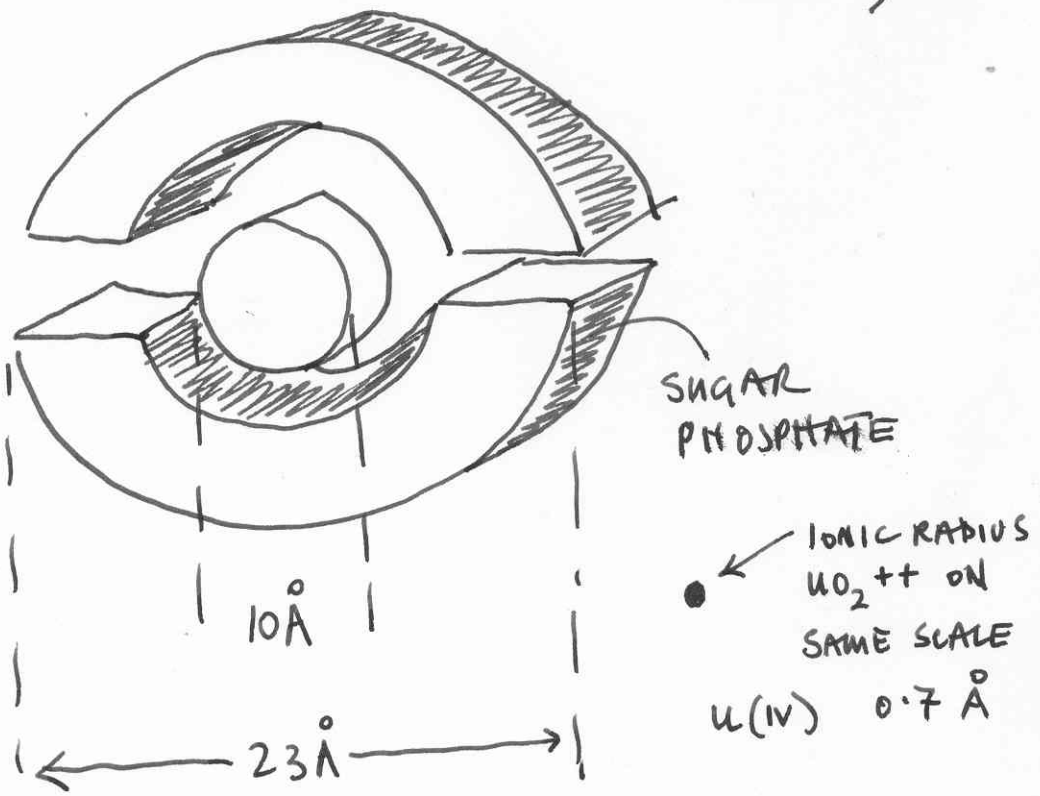
Huxley and Zubay (1961) stated that DNA takes up its own dry weight in uranium from a 2% fixing solution

Some DNAP dimensions





Uranium bound to the DNAP is within 2.3nm of the axis of the strands, but in the condensed chromatin, is buried deep within a mass of chromosomal genetic material. It will preferentially absorb gamma and X-ray background and re-emit the energy as short range photoelectrons



DNA DIMENSIONS.

Elsaessar (2008) has carried out a Monte Carlo FLUKA (CERN) calculation that confirms the photoelectron enhancement

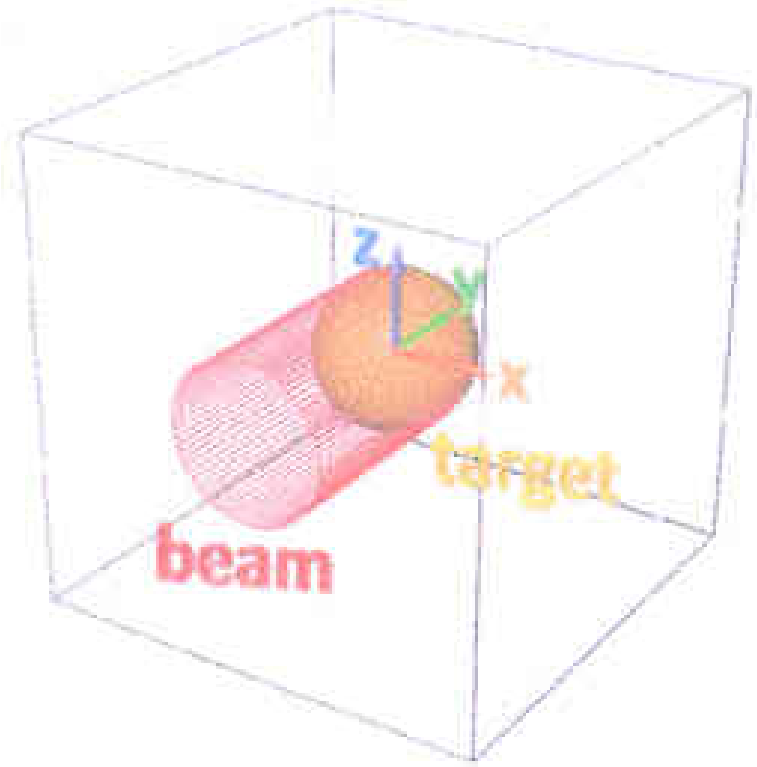


Fig.1: beam and target geometry

Results: Water, Gold, Uranium

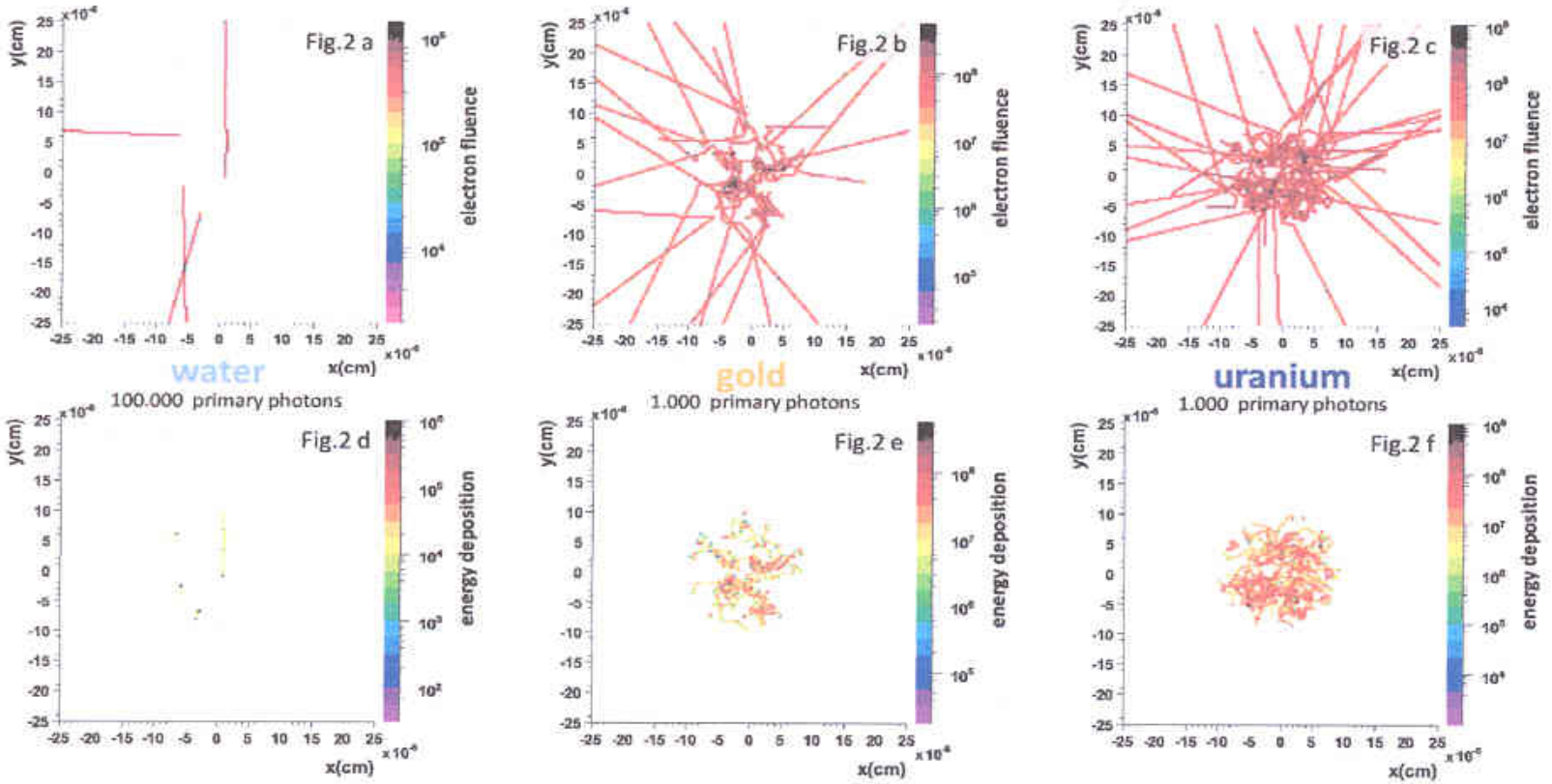


Fig.2:secondary electron production within the target and escaping electrons overlayed by the target geometry for water (a), gold (b) and uranium (c).Fig.2 (d)-(f) shows the corresponding energy depostion in the target material.

Fig.3: ratio of electrons leaving the target material (gold) to incident primary photons. The incident photon energy is 100keV, 10 keV and 2 keV.

Fig.4: same ratio as Fig.3 but weighted with the beam projection area and the target volume.

This falsifies the ICRP model for uranium exposure, which underpins all the military arguments that Uranium weapons are safe

Conclusions

The increases in childhood leukemia and other childhood cancer are primarily caused be exposure to internal man-made radionuclides.

The ICRP model used to underpin the operation of nuclear plants and discharges of radiation to the environment are flawed by more than two orders of magnitude.

This is arguable in terms of theory (high local dose, uranium etc.) and clear in epidemiological studies, specifically the Chernobyl Infants.

The current cancer epidemic in adults has the same principal cause.

It is time to reassess the risks of radiation

These effects were discovered by independent research, often with no funding: at no point were they found through studies funded by any official agency. The Sellafield leukemias were discovered by a TV company.

Whenever these findings have emerged, they have been attacked, denied and marginalised. This is because of the power of the nuclear/military lobby.

Conflict of interest in any peer-reviewed publication has to now be admitted. Since 1959, the World Health organisation (and the FAO) have been constrained in their research by agreements with the International Atomic Energy Agency. This atmosphere of corruption has extended to all other risk assessment agencies who routinely have the same members. The result has been that:

The global death yield of the nuclear age to 1992 has been horrifying. According to objective calculations by the European Committee on Radiation Risk (using weapons fallout radiation exposures) there have been (ECRR2003) :
61 million cancer deaths
1,600,000 infant deaths
1,880,000 foetal deaths
There has been a loss of life quality of 10% (in terms of illnesses and ageing effects).
The blame for this can be squarely placed at the door of those scientists and administrators (WHO, UNSCEAR, ICRP) who developed and supported the scientific risk models. This is a war crime far greater in magnitude than any that has occurred in recorded human history.

You may learn more about this issue and specifically the cover-ups from my book:

Wolves of Water
Chris Busby
(Green Audit 2007)
order from any bookseller

Details of the studies are on the websites:
www.llrc.org
www.greenaudit.org
www.euradcom.org