10032-Residential Radon and Lung Cancer Mortality in U.S. Women who Predominantly Never Smoked: An Ecological Study

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Mean levels of residential radon (Rn) in U.S. counties have been observed to exhibit a negative ecologic association with corresponding age-adjusted lung-cancer mortality (LCM) rates. This association may be erroneous due to (A) confounding unaddressable by any county-level ("ecological") study design, (B) county-level Rn/smoking or Rn/age correlations, and/or (C) exposure misclassifications arising from previous reliance on age-adjusted LCM data and disparate sources of exposure data. In an attempt to address issues B and C, a comparison was made between age-specific 1950–54 LCM rates for white women in 2,821 U.S. counties vs. estimates of corresponding county Rn levels based on a new analysis of U.S. Rn, climatic and geological-survey data. Statistically significant negative ecological LCM vs. Rn associations were found for women who died at age 40+ (~11% of whom ever smoked; $p \leq 0.05$ in 209 of 210 analyses done), and also for women who died at age 60+ (~5% of whom ever smoked; $p \leq 0.05$ in 207 of 210 analyses done), after adjusting for age and subsets of 21 county-level socioeconomic, climatic and other factors. These negative associations were strengthened in analyses restricted to 2,520 counties estimated to have average residential Rn levels ≤100 Bq m^{-3} ($p < 0.001$ in all 420 analyses done). However, relative risk (RR_{adj}) of LCM in all women (i.e., who died at age 40+) was found to be significantly elevated ($1 <$ [95% conf. limits on RR_{adj}] < 1.5) in 42 of 210 comparisons of counties with Rn levels of >150 vs. 65–100 Bq m^{-3}. Each of these 42 comparisons involved adjustment for age in combination with climatic and other factors likely to have influenced exposure to indoor air contaminants, such as Rn and (secondary) cigarette smoke. Among these 42 comparisons, those that included latitude as an adjustment factor resulted in the greatest amount of observed significantly elevated RR_{adj}. This observation of significantly elevated LCM risk associated with residential Rn is the first ever to be reported based on an ecological analysis of nationwide U.S. county-level data. The magnitudes of significantly positive ecological LCM vs. Rn associations observed in this study are consistent with those previously estimated from case-control data. However, results from the present study are not consistent with a significant radon-related increase in 1950-54 LCM among white women who predominantly never smoked and who died in U.S. counties with mean residential Rn concentrations ≤100 Bq m^{-3}. [Work performed under auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.]

10081-Is light a risk factor for internal cancers? - Rationale for a study based on light dosimetry by geography

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Sunlight exposes man everywhere and anthropogenic sources constitute further universal exposures to visible electromagnetic radiation. Breast cancer is the leading cause of cancer morbidity and mortality in women in many countries and prostate cancer is the most common noncutaneous cancer in men. Large international differences in rates of hormone-related cancers suggest that environmental factors play an etiologic role and it appears very likely that a modulation of endocrine systems is relevant. Ubiquitous light does exactly the latter: experimental and clinical evidence indicates that light of intensities which we experience regularly modulates the endocrine system. Moreover, abundant evidence links hormones to a broad range of health outcomes including cancer. To date, however, we have no conclusive evidence that a causal link between light, endocrine systems and cancer is valid in humans and relevant to public health.
Cross-border geographical diversity in Europe offers a unique opportunity to disentangle exposure gradients and increase the knowledge on dose-response relationships between ubiquitous light and endocrine effects. The assumption is that photoperiods, i.e. the ratio between the day's and night's length, differentially affect homeostasis of melatonin and further hormones depending on the geographical latitude. We pursue answers to two research questions: (i) Can large geographical variations of visible light differentially affect endocrine systems in European populations?, and if so, (ii) does light determine differences in hormone-dependent cancer incidence/promotion in European populations?
We intend to investigate (i) by measuring individual and seasonal variations of melatonin, gonadal steroids and cortisol levels in saliva and urine of a sample of 300 healthy residents from the Arctic to the Mediterranean. These measurements can then be compared with the same individuals' exposures to natural and artificial light during significant seasonal periods. In this way, it will be possible to identify associations and to estimate relations between temporal rhythms of melatonin and further hormones and 1) exposure to natural light, 2) exposure to artificial light, and 3) total exposure, i.e., 1) and 2).
Provided that variations of endocrine responses to photoperiods can be identified in residents at different latitudes, we shall conduct a sequitur study into the biologically plausible link between light, endocrine effects and cancer (research question (ii)). Further endpoint investigations of aging, reproduction, sleep and mood disorders could be based on the logistics and the database which can be created in the course of this study. Our PELICAN consortium (Pan-European Light and Cancer) has been formed to pursue the envisaged research.

10372-EPIDEMIOLOGICAL INVESTIGATION OF THE HEALTH STATUS OF CHERNOBYL CHILDREN WHO WERE EXPOSED IN UTERO

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Background:
On 26 April 1986 the largest disaster in the history of nuclear industry took place at unit IV of Chernobyl Nuclear Power Plant. It affected 17.5 million people, including several thousands of pregnant women. The exposure of the total Ukrainian population is estimated to be 50,000 manSv over 10 years (National Report of Ukraine, 2001).

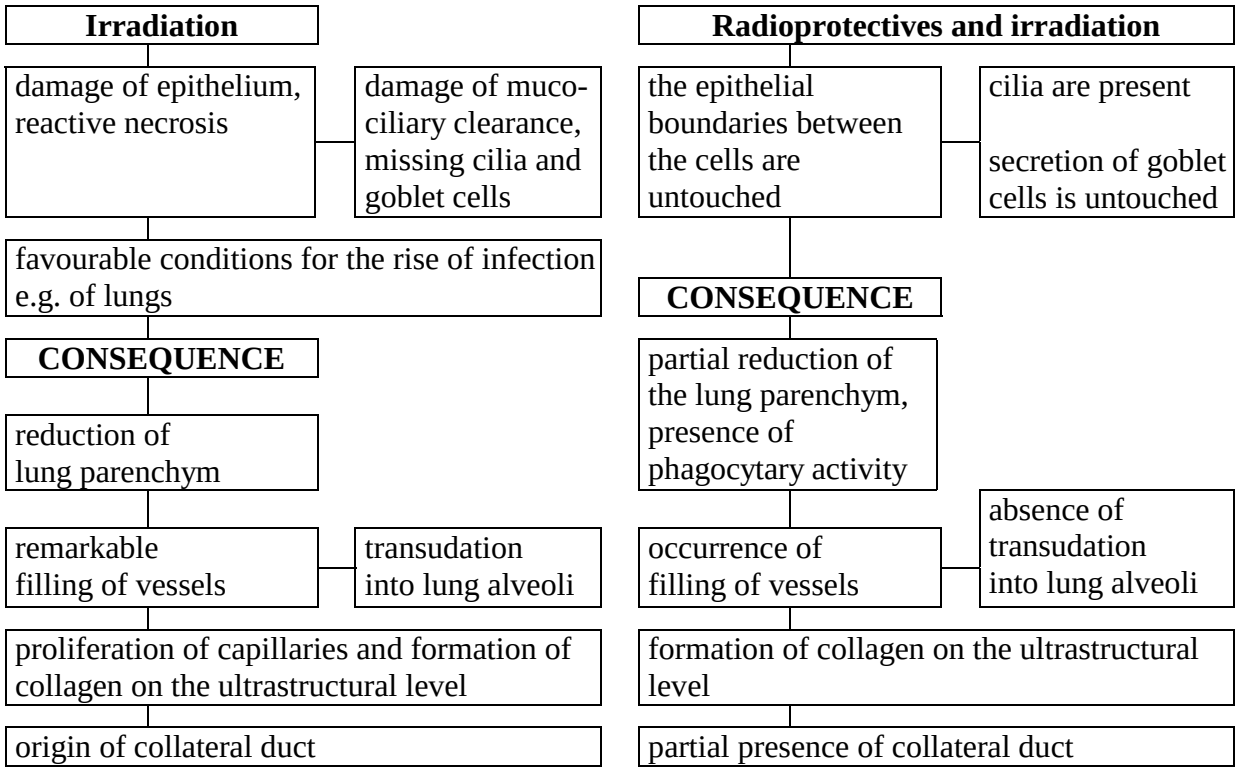
Objectives:
To investigate the health status of children who were exposed to ionizing radiation in utero.

Methods:
A sample of children who were born from woman who were pregnant at the time of the disaster (231 girls and 223 boys) and whose mothers were evacuated to Kiev were followed up from 1987 to 2000. A randomly sampled cohort (1000) of Kiev children of the same age was used as a control. The children were given a clinical examination every year. For diagnostic coding ICD-9 was used. Psychological observation included GHQ-12 for the adolescents and a social questionnaire for parents. School performance was assessed by the subjects themselves and their teachers and rated on a five point scale ranging form very good to very poor. For statistical analysis the Epicure statistical package was used. 72 % of the Chernobyl children were exposed at the third term of the pregnancy; 28 % at the second term. The fetal doses were estimated using an internationally accepted model for dose reconstruction.

Results:
The results of the annual observation indicate a serious deterioration of the health status among the children exposed in utero over time. By the year 2000 there was a significantly higher relative risk of lung diseases, cardiovascular disorders, and nervous and immune system disorders during the whole period. The number of children who were receiving disability benefits was 3.3 higher in comparison to other Ukrainian children. Psychological examinations showed that the prevalence of a GHQ-12 scores > 4 was higher among the exposed group (8 % versus 3 %). At the same time exposed children performed much better in school than children from the control group. No association between estimated dose of exposure, term of pregnancy at the time of exposure and physical health status was found. However, having a high GHQ score was a risk factor for a number of physical disorders, e.g. there was a 5 times higher rate for peptic disorders.

Conclusions:
This study shows that the health and psychological status of exposed children is poorer that of matched controls, except for school performance. Psychological variables appear to offer the best explanation for the observed health differences. It may be hypothesized that being a member of an official “group of special social care” the exposed children were able to benefit from long-term international humanitarian support programs which helped them in intellectual and cultural development but with limited effect on their overall health status.

10735-Also irradiation which is used therapeutically represents intervention to the environment of a cell. One must keep in mind that besides the originaly occuring pathologic cells the irradiation itself may be responsible for the appearance of damaged cells. It may extend functional inability not only of parenchym but also of stroma in the organ. Prognosis of appearance of this event can be reduced by radioprotectives. We are presenting a comparative study on a set of 45 experimental animals (mice BALB/c) divided into three groups: Control, Exp.1 (irradiated), Exp. 2 (aplication of alpha-metyl-homocysteine thiolactone (100 mg/kg body weight) and afterwards irradiation).
Our morphological findings in experimental groups we summarized to the following scheme (reader can see significantly different response of organism on the whole body irradiation with the dose 6.02 Gy; connective lines in the scheme represent arrows going downwards or from left to the right side):



This work points out how cells respond on change of the environment. From the point of view of functional ability of cells our finding is a contribution for their prognosis as part of tissues and organs [This work was performed within the Austria-Slovakia project 37s1].

11141-Exposure to Radar and Dose-Response: Preliminary Findings

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Background: Reports indicate that risks for cancer, notably hemato-lymphatic and brain, are associated with exposures to radiofrequency-microwave from radar microwave. Occupational studies indicate increased risks for hematolymphatic and brain cancer in electronics, radar and communications workers. Community studies on risks near radio-TV and cellular telephone towers have also been reported. If separate results from different studies from different places suggest a coherent pattern of dose-response, the case for cause-effect is strengthened; if not, it is weakened. **Objectives:** To examine results from 3 separate studies for which there are data on exposure and effect. **Methods:** We plotted data on reported and estimated intensity and cumulative exposures and risks from Goldsmith's reexamination of Lilienfeld's data on the Moscow Embassy, Szmigielski's studies on radar workers in the Polish Military, and our own data from a small cohort or radar technicians with extremely high exposures against estimated cumulative exposures. (Table) **Results:** The results suggest a threshold for intensity of exposure and cumulative risk between 1 and 10 uw/cm2 for all tumors combined and a suggestion of increases in risk some 150 to 500% more than expected for estimated cumulative lifetime exposures substantially below 5000 mW/cm2, with much higher exposures producing much higher risks. **Conclusion:** Additional data from other studies are needed, but the relationships are sufficiently suggestive to state the case for preventive measures to reduce exposures to as low as 1 uw/cm2.

Cancer Risks Associated with Intensity of RF/MW Exposures
Dose-Response: Data for 3 Studies

Study	Reported Exposure	Exposure Levels (mW/cm2)	Cumulative lifetime exposure (mW/cm2/hr)	# of neoplasms (all; observed)	ratio and	p-value
Lilienfeld AM, 1978 Goldsmith JR, 1995	5-18uW/cm2	0.01	31.25	10	2.7	<0.05
Szmigielski et al, 2001 (years 1985-1990)	1.5W/m2	0.15	562.5	14	1.5	0.97-2.03
Szmigielski et al, 2001 (years 1985-1990)	4W/m2	0.4	1500	9	1.39	0.73-2.05
Szmigielski et al, 2001 (years 1985-1990)	8W/m2	0.8	3000	7	4.08	3.33-4.83
Szmigielski et al, 2001 (years 1985-1990)	>10W/m2	1	3750	6	4.38	3.58-5.18
Richter et al, 2000	7.5 mW/cm2	7.5	46875	7	77.8	<0.001
*Szmigielski data: calculated SIRs for different exposure groups, author did not do these calculations in his paper (Szmigielski, 2001						
number of cases used in non-exposed group is an approximation (# of cases from 20 years of follow up/ 4; to adjust for 5 year fo						
period used in exposure data; error +/-5%						