occupational caused by UV, and provides support for the applications of the relevant ILO instruments in member States.

876 RADIOLOGICAL LICENSE TYPE I-C INSTALLATIONS IN MEXICO

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Introduction To carry out the licensing process for facilities classified as Type C, in Mexico, the Procedure:Manual on Radiological Safety must be submitted to the COMISION DE SEGURIDAD NUCLEAR Y SALVAGUARDAS (CNSNS) Nuclear Radiological Safety National Comission which should include general specifications of the installation, to demonstrate that the characteristics of Radiological safety are according with the requirements and include a radiation safety policy, which will apply during the operation, the termination of operations.
Methods According with the Mexican standard and the CNSNS the company should work to implement all the procedures and requirements, first stage include paperwork and external training, the next stage include implementation policies and internal audit, all the documents are send to de government an external visit could be request to demonstrate all the requirements.
Results The radiological safety program will be successful according to the proposed activity risk analysis and emergency plan, and include a failure analysis. With an adequate implementation program, health and environmental radiological monitoring program the organisation should determinate potential risk to release radioactive material out of the facility, and demonstrate that radiological risks resulting from the cessation of operations will be appropriately managed in such a way as to ensure the safety of personnel occupationally exposed, the public and the environment
Conclusion With an adequate program the company will be able describe the design aspects, engineering works, systems, equipment and devices that allow safety operations with radiation sources and minimise the exposure of personnel to radiation and the production of radioactive waste, Containment necessary to limit the release of radioactive material. Estimate dose equivalents, exposure routes and exposed personnel medical control.

124 OCCUPATIONAL EXPOSURE TO RADON: AN UNDERESTIMATED RISK IN VIEW OF THE COMBINED EXPOSURE TO OTHER OCCUPATIONAL AND ENVIRONMENTAL LUNG CARCINOGENS

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Introduction Radon is a well-established human carcinogen, targeting the lung. A lot of epidemiological studies conducted on both uranium miners and general population in dwellings provided a risk quantification due to radon exposure, by alone and in combination with tobacco smoke. However, little is known about the risk due to combined exposure to radon and other occupational and environmental lung carcinogens.
Methods Literature review to identify the most critical scenarios of combined exposure to radon and other lung carcinogens, providing a framework for the risk assessment and addressing the planning of epidemiological studies.
Results The combined exposure to radon and other lung carcinogens may be relevant for several indoor working environments. However, it is important to keep in mind that for a number of workers a combined exposure may occur in a sequential way, i.e. to radon in indoor settings and to outdoor carcinogens if the job/s are conducted at least in part outdoor. Apart the tobacco smoke, co-exposures of interest include asbestos, crystalline silica, polycyclic aromatic hydrocarbons, hexavalent chromium, nickel and outdoor air pollution, all extensively assessed in both epidemiological and/or experimental studies.
Discussion Prevention of lung cancer occurrence in radon-exposed workers has not only to take into account the long-term indoor radon concentrations, as obtained by conventional dosimetric assessment, and the smoking status of the worker, but must include an accurate assessment of the patterns of exposure to other lung carcinogens, both ubiquitous and typical of a particular occupational or living setting. Unfortunately, validated biomarkers of exposure, early biological effect/s and individual susceptibility are not available in this regard and different lung carcinogens display different kinetics and may act through several distinct (although partly overlapping) cellular and molecular pathways, both genetic and epigenetic. The development of 'omics' approaches represent a promising tool to address this topic.

1322 EXPOSURE TO STATIC MAGNETIC FIELDS AND DISTURBANCES OF ACTIVE IMPLANTABLE MEDICAL DEVICES

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Introduction According to Directive 2013/35/EU for magnetic fields from 0 to 1 Hz, the exposure limit value (ELV) for sensory effects due to magnetic flux density is 2 T (Tesla) and 8 T for limbs. Interference with active implanted devices, e.g., cardiac pacemakers, starts at an action level (AL) of 0.5 mT. Interference can influence the functioning of medical devices. The aim is to describe some examples of static magnetic field exposure and calculations to evaluate the possible risk of disturbances to medical devices.
Methods We measured and analysed field values on the surface of magnetic objects and how the exposure to static magnetic fields decreased when the distances of the source increased. The used metres were based on Hall effect sensors; Holaday Industries HI 3550 or Extech MF100. Then, we compared theoretically measured values to the abovementioned directive levels.
Results Static magnetic flux density can be high (e.g., 20–200 mT) at the surfaces of magnets, and magnetising fields can be very high (0.5–3 T). However, the distance attenuation decreases the flux rapidly; for example, at a distance of 1 cm from the cable, the field can be 2.5 mT (shielded cable, current 400 A), but at a distance of 10 cm, 0.5 mT (AL for active implanted devices), and 30 μT at a distance of 1.0 m.

Thus, the DC field very seldom exceed the action value. These attenuations can also be calculated theoretically.
Discussion Our focus was on implantable medical devices. The distance to magnetic objects was found to be critical.

233 USE OF MOBILE PHONES AND LIGHT METRE APPLICATIONS IN THE ASSESSMENT OF THE OCCUPATIONAL LIGHTING ENVIRONMENT

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Introduction With a variety of built-in sensors, smartphone users can do many things with only one portable device. Light metre applications measure illuminance and are offered free or at low cost. Like noise metre apps, it is tempting to use such devices for preliminary lighting surveys. However, there are few reports of studies evaluating such use, and none which have explored their potential use for blue light hazards. This paper presents preliminary data on side by side measurements of illuminance and blue light hazard (BLHF) function-weighted illuminance with a range of smartphones, apps and light sources.
Methods Phones with Android and Apple iOS operating systems and two phone apps were compared alongside a professional lux metre on a workstation desk in a mock office, set up in a dark room. A blue light filter (Hoya B440) was used directly over the sensors for the approximate BLHF weighted value.
Results The values of the illuminance and blue-weighted illuminance differed depending on distances and the types of light sources. The illuminance values for Android and Apple devices using the same software were variable suggesting differences in sensor hardware or circuitry. There were major differences between forward and rear facing sensors. The use of the blue light filter significantly reduced illuminance readings, limiting practical application for some devices.
Discussion The rationale for the use of BLHF filters on photometric instrumentation for blue light hazard assessment has been described in the literature. Calibration factors for both naked and filtered sensors need to be established for specific phones and software. The limitations and variances of particular combinations also need to be understood. However, in principle, the use of a smartphone in preliminary lighting surveys may be feasible, and if so, guidance for their use may be developed.

1545 ASSOCIATION BETWEEN ENDOCRINE FUNCTION AND RADIATION EXPOSURE

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Introduction There has been a growing focus on endocrine dysfunction especially thyroid dysfunction after radiation exposure recent years. Thyroid dysfunction caused by radiation exposure or other reasons may be associated with change in BMI, weight and even induced obesity and metabolic consequences including diabetes. On the basis of above theories, we decided to observe the likely relationship of endocrine function changes within radiation exposure.
Methods A total of 1784 subjects from physical examination organisation for occupational health were investigated. Subject information was collected with a questionnaire that was carried out through interviews in the forms of face-to-face. We entered all data into a computerised database using the statistical analysis Epidata3.1, all analyses were performed by SAS 9.1.3 software. $p<0.05$ was generally accepted as statistically significant.
Results The abnormal proportion of T3 and T4 in female were higher than them in male ($p<0.05$). Abnormal rate of FT4 increased, accompanying with the growth of age ($p<0.05$). In addition, T3 and FT3 levels may be associated with exposure time of X-ray. On the basis of this survey, abnormal rate of T3(1.4%) and FT3 (1.0%) were higher in group <3 years than that in group ≥3 years (0.3% and 0.1%, respectively. $p<0.05$). We compared serum T3, T4, TSH, FT3 and FT4 levels between different degrees referred to exposure time of radiation. Subjects whose duration time longer than 3 years were likely to have higher T4 contents than those who contact less than 3 years ($p<0.05$). Furthermore, normal T4 subjects and abnormal ones were researched separately. In this study, serum T4 was significantly and positively related with BMI in the T4 normal group. Within normal T4 level, T4 was a little weak positive-correlated with BMI.
Conclusion Changes in thyroid function and glucose metabolism may appear after long time exposure to radiation.

127 KNOWLEDGE AND BEHAVIOURS RELATED TO SUN PROTECTION AND USE SUNSCREEN AMONG ACADEMIC STAFF IN MUGLA, TURKEY

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Introduction The increase of cutaneous melanoma, skin cancers and other skin diseases incidence is parallel with the increase in sun exposure. The aim of this study was to investigate the knowledge, attitudes and behaviours of academical staff in Mugla in Turkey related to sun protection.
Methods A cross sectional analysis has been conducted in which 1437 academic staff were selected. Of this selected group, 438 participated in the study. Academic staff in Mugla were asked to complete our questionnaire consisting of 26 questions. The questionnaire included questions about the socio-demographic characteristics of the participants, the stories of sunburn and skin cancer, attitudes and behaviours related to sun protection, the habits of using sun protective creams, and the levels of knowledge about sunscreen creams and ultraviolet.
Results The study was composed of 196 (44.7%) women, 242 (55.3%). Mean age was 38.6±0.3. Using, using sunglasses, avoiding sunlight were among the first three methods of sun protection practiced by the academic staff. 36.1% of the participants stated that they only used sun protection cream while 'only going to sea', 29.5% of the participants stated that they used 'only in summer' and 14.6% of the participants stated that they always used. When academic staff assessed