## Test Sanità 002

# **Report of Contributions**

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### SISTER CHROMATID EXCHANGERS ANALYSIS AMONG UNDERGROUND WATER WELLS WORKERS IN SAUDI ARABIA

### Keywords

Cytogenetics, Sister Chromatid Exchanges and Biological indicators of exposure

### Summary

In the absence of permanent rivers or bodies of water Half of the Saudi Arabia domestic water consumption is provided through desalination. The other half is derived from groundwater. Groundwater from the Disi aquifer is already used for drinking water in parts of Jordan and, more extensively, in Saudi Arabia, where it is known as the Saq aquifer. Some of the geological analyses of the host sandstone aquifer rocks show 228Ra and 226Ra. The usefulness of chromosomal aberrations analysis as a bioindicator for ionizing radiation effect was tested in underground water well workers at Saudi Arabia in this industry producing technologically enhanced naturally occurring radioactive material (TENORM). The induction of sister chromatid exchanges (SCE) was studied to assess the potential genotoxic effects of occupational exposure to Radiation. Blood samples were obtained from 10 persons working in underground water well. The age range of the workers was 25-40 years and their duration of service ranged from 3-7 years. For comparison blood samples were also collected from 10 subjects (controls) who belonged to same age and socioeconomic status. Subjects in the both groups were nonsmokers and non alcoholics. The occupationally exposed workers showed higher SCE frequencies than the non-exposed group. The results of this study demonstrated that occupational exposure to radiation leads to a significant induction of cytogenetic damage in peripheral lymphocytes of workers engaged in underground water well.

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# The single-aliquot additive dose method for retrospective EPR dosimetry in irradiated dried fruit

Keywords: EPR/other materials irradiated food. Retrospective dosimetry. Mixed fields.

### Summary

The identification of irradiated dried fruit can be achieved by means of the EPR spectroscopy, as recommended by the European Community (1), since ionizing radiation induces free radicals in cellulose, a constituent of the fruit shell. The EPR signal is due to a group -CH2OH of the glucose molecule, produced after a homolitical cleavage of the carbon-oxygen bond and consequent loose of the OH radical. Unirradiated samples give only one singlet EPR signal, whereas in irradiated samples a pair of satellite lines appear, spaced 60 mT each other. Positive identification of the EPR lines ascribable to the cellulose radicals is evidence of irradiation, but their absence does not constitute evidence that the sample is unirradiated. The aim of this work was to use the EPR spectroscopy also as a quantitative procedure to evaluate the original dose in irradiated dried fruit, using the single-aliquot additive dose method, previously successfully applied to bone samples (2). Samples of nuts, chestnuts, peanuts and pistachios were irradiated at "original" dose values in the range 1 🛛 8 kGy. Little shell pieces were taken from these irradiated dried fruits, their EPR spectrum was recorded, and the peak-to-peak intensity of the satellite lines was measured. Each aliquot was then irradiated with additive doses of 1 kGy each, and the cumulated EPR signal intensity was measured after each re-irradiation. The following mathematical relationship between the EPR signal intensity and the additive dose D was used:

Back extrapolation to the dose axis gives an estimation of the original dose (3).

Our results show that the single-aliquot additive dose method gives an estimation of the original dose within  $\pm 30\%$  in all the studied aliquots. An investigation on the time stability of the EPR signal was also carried out: the signal intensity decreases during the first days after irradiation, and remains almost steady afterwards. A procedure was therefore developed to take into account this signal fading when dose reconstruction is performed with the additive dose method. The method set up in this work allows, besides the identification of irradiated dried fruits, to check if the given dose is within the recommended limits.

#### References:

(1) EN 1787, (2000). Foodstuffs-Detection of irradiated food containing cellulose by ESR spectroscopy. European Committee for Standardization, Brussels, Belgium.

(2) Parlato A., Calderaro E., Bartolotta A., D'Oca M.C., Brai M., Marrale M., Tranchina L. (2007): Application of the ESR spectroscopy to estimate the original dose in irradiated chicken bone. Radiation Physics and Chemistry. v. 76, 1466-1469

(3) Desrosiers, M.F., (1991). Estimation of the absorbed dose in radiation processed food. Test of the EPR response function by an exponential fitting analysis. Applied Radiation and Isotopes, 42, 617-619.

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Contribution ID: 2

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### Retrospective dose estimation for individual exposed to accidental irradiation in uterus 16 years ago with FISH

Keywords Cytogenetics(FISH); Biodpsimetry; Retrospective dosimetry; Post accident dosimetry

### Summary

A fetal accident occurred in November 1992, in Xizhou City, north China's Shanxi Province. It killed a construction worker who picked up the abandoned 10-Curie Cobalt-60 source at his construction site and took it home. The worker, his father and brother died during 3 weeks. His wife, the four months pregnant mother, also suffered from a moderate acute radiation sickness with retardation of fetal development. After delivery, the infant's body length, body weight and head circumference were all lowered by three percentiles compared with those of the normal. Sixteen years later, the child still cannot do the simple addition or subtraction. It is needed to accurately estimate the absorbed dose for the child.

This study is to reconstruct the absorbed dose for individual who accidentally exposed to irradiation in uterus 16 years ago. Peripheral blood samples were drawn from the child and her mother. The dicentric and centric ring chromosome aberrations were analyzed with conventional method, the micronucleus was observed with cytokinesis-block micronucleus method, and fluorescence in situ hybridization (FISH) with chromosomes 1, 2 and 4 painting probes were used for translocation detection. Dose estimation was carried out according to the standard dose-response curves previously established in our lab. The results showed that no unstable chromosome aberrations and normal micronucleus frequencies were observed in two persons 16 years after the accident. According to the established dose-response curves with FISH in our lab, the residual irradiation doses for mother and daughter were 0.76Gy (95%CI was 0.41⊠1.00 Gy) and 0.61 Gy (95% CI was 0.44⊠0.86Gy), respectively. Because the biodose estimated for mother 1 month after the accident was 2.30 Gy (95% CI was 2.07⊠2.50Gy), the dose correction factor was 3.03 for dose estimation 16 years after. The estimation dose in uterus irradiation for case was 1.85 Gy (95% CI was 1.33⊠2.61Gy). The estimated dose for individual who accidentally exposed in uterus 16 years ago could be obtained according to the dose correction factor of mother with FISH method.

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