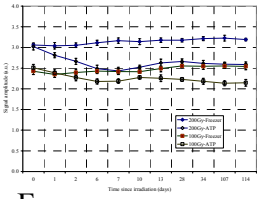
STABILITY OF EPR SIGNALS AFTER IRRADIATION OF FINGERNAIL SAMPLES



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Recent studies have documented the origin and ways to correct for EPR signals of non-radiation origin, MIS and BKS (termed MIS1 and MIS2 in ref. 1), and have shown that the MIS1 completely fades in 20-24 hrs at room temperatures and that the MIS2 increases with time to a saturated value. It has also been suggested that the RIS fades at room temperatures but not at low temperatures. This study evaluates the fading of the RIS during storage in both stressed (untreated) and unstressed (treated as described in ref. 1) samples (n=20) with controls for sample size and number of clippings at two temperature conditions: freezing (temp ≈ -20^{o}C) and room temperature (20-24 ^{o}C). Controlled samples irradiated to 15 and 20 Gy were measured for over 200 days and those irradiated to 100 and 200 Gy were measured for 114 days. Uncontrolled samples irradiated at 1, 3, 8, and 20 Gy were followed for 25 months. All samples that were kept at low freezing temperatures showed a stable RIS with no significant fading. All samples that were kept at room temperatures showed an initial fading of the signal with a slow rise of the RIS amplitude with time to a saturation level. Free radicals in stressed and unstressed samples kept at low temperatures induce a significantly stable EPR signal. Since there are not many mechanical changes in the structure of the fingernail tissue while they are kept at low temperatures, we do not see changes in the MIS2, which is the reason for the increase of the signal when samples are kept at room temperatures. Measurements of the RIS cannot be done in stressed samples because they are affected by the stress forces that in vivo samples would normally have not been subjected to. Since treatment would only affect the mechanical signals and not the RIS, a more accurate method for measuring the RIS may require that samples be treated during measurements as they dry with time at room temperatures.

References

1. Reyes R.A., Romanyukha A., Trompier F., Mitchell C.A., Clairand I., De T., Benevides L.A., Swartz H.M. Electron paramagnetic resonance in human fingernails: the sponge model implication. Accepted for publication in Radiat. Environ. Biophys. (2008).