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EFFECT OF EXTRATERRESTRIAL SOLAR UV RADIATION (GROUND BASED SIMULATION AND *IN SITU* STUDIES)

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Research Group for Biophysics developed DNA based biological UV dosimeters for assessing the biological hazard of the living systems on the Earth surface and in different waters (rivers, lakes, seas, etc.). In dosimeters a bacterial virus, bacteriophage T7 and polycrystalline uracil layers were used as biological detectors. The UV effect in phage T7 and uracil detector was evaluated by loss of viability and by the decrease of the characteristic optical density, respectively (Rontó et al. 1995, Bérces et al. 1999). Recently the increasing human space activity has increased the need to measure the biological effect of extraterrestrial solar radiation.

More than 50 years ago (Setlow & Setlow,1962) it was demonstrated that the reversion of UV induced (e.g. at λ~280 nm) pyrimidine dimers in DNA could be reversed by a shorter wavelength (e.g. λ ~230 nm) UV radiation. Similar informations on the photobiological effect of far UV radiation have been obtained using the synchrotron radiation) facilities for irradiating the biological samples.

The extraterrestrial solar radiation contains far UV components too, so both dimerisation and monomerisation processes can be induced in nucleic acid (NA) samples, (or in its constituents) in the space. Dimers can cause lethal injuries, while reversion of dimer can repair the injury. For biological systems the latter process can be beneficial, thus for dosimetry purposes one has to take into account both processes.

The aim of this study to determine separately the dimerisation and monomerisation kinetics for our former biological detector systems used for terrestrial dosimetry. For the ground based simulation of the extraterrestrial solar radiation high pressure Deuterium lamp was used, supplied with nine narrow band interference filters (the half-width of 10 nm) in the wavelength range 220—340 nm. *In situ* experiments are now in progress on the external pallet of the International Space Station (ISS) where the samples are exposed directly to the exraterrestrial solar radiation.

The monomerisation—dimerisation processes can influence in the space the survivability of various simple living systems like bacteria, viruses, spores etc. Aiming to avoid the contamination the space/space objects with terrestrial microorganisms or the Earth with organisms of extraterrestrial origin, an important task for astrobiology is to establish the extraterrestrial solar dosimetry.

REFERENCES

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