INFLUENCE OF WAVE LENGTH, FREQUENCY AND DUTY CYCLE ON THE INDUCTION OF DNA DAMAGE BY PULSED VERSUS CONTINUOUS ULTRAVIOLET RADIATION

García-Valbuena, C.[1]; Rodríguez, R.[1]; Cotarelo, A.[1]; Gutiérrez, D.[2]; Álvarez, P.[2]; Ferrero, F.[2]; Campo, J.C.[2]; Valledor, M.[2]; Sierra, L.M.[1]

[1]Área de Genética, Dpto. Biología Funcional,

[2]Área de Tecnología Electrónica, Dpto. Ingeniería Eléctrica, Electrónica, de Computadores y Sistemas, Universidad de Oviedo

uo238066@uniovi.es

The development of light-emitting diodes (LEDs) in a broad wavelength range, that includes ultraviolet (UV) radiation (UV-LED), has considerably improved the advantages of these sources of UV radiation, compared to the traditional low-pressure mercury lamps. UV-LEDs present long-life, are compact, robust and efficient, low-energy demanding, do not need pre-heating and do not produced mercury as waste. Moreover, they can be easily prepared for different wavelengths, and the emitted radiation can be modulated, varying both pulse frequency and width, or duty cycle.

However, little is known about the effect of this modulation on DNA damage induction. We have designed a versatile and easy to use lighting system that enables pulsed emission at different duty cycles and pulse frequencies, with UV-LEDs of 260 and 285nm. We have used it to check the effect of these variations on DNA damage induction, using the *Salmonella* reverse mutation assay, which detects mutations that revert the histidine-dependent genotype of *Salmonella typhimurium* strains. Among the strains available, TA102 was designed to specifically study the mutagenicity of some agents, including UV radiation.

Results showed, first of all, that pulse radiation could be more mutagenic than the continuous one, depending of the combined studied parameters. Pulse frequency analysis of 100, 500 and 5000Hz, revealed a clear effect, independent of the wavelength, since the lower the frequency, the higher the induced mutation frequency.

Duty cycle results, analysing 25 and 50%, were however controversial, because it apparently depended on the used UV-LED. The wavelength analysis confirmed higher mutagenic activity at 260 than at 285nm.