PHOTOTOXICITY OF PYRENE AND IT’S MONO-SUBSTITUTED DERIVATIVES ON HUMAN SKIN KERATINOCYTE CELLS

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Abstract: Polycyclic aromatic hydrocarbons (PAHs) are a class of mutagenic environmental contaminants that are produced from the burning of fossil fuels, burnt foods, tobacco smoke, and other sources. PAH exposure can occur by ingestion, inhalation, and absorption through the skin. They cause damages when being activated by light irradiation. We chose pyrene, one of the most studied and a priority pollutant on the US EPA’s list, and its mono-substituted derivatives, 1-amino, 1-bromo, 1-hydroxy, 1-nitropyrene to study the effect of a substituent on the phototoxicity of pyrene. After confluence, the HaCaT keratinocytes were grown on 6 well plates under 37°C/5% CO₂ incubation until confluence and later exposed to the PAHs at 1.0 µM and/or UVA light. Both the alkaline Comet Assay, which detects direct DNA damage, and the Fpg endonuclease Comet assay, which detects oxidative DNA damage, was conducted at 0, 2, 4, and 24 hours after treatment. Previous cytotoxic data have shown that the cell plates treated with pyrene, 1-aminopyrene, 1-bromopyrene, 1-nitropyrene and 1-hydroxypyrene and UV light were phototoxic, and this phototoxicity was dose dependent; whereas, those plates treated with pyrene, 1-aminopyrene, and 1-hydroxypyrene in the absence of UV light did not exhibit signs of toxicity. Preliminary data have shown that the cell plates treated with the studied PAHs at 5.0 µM and UV light were too phototoxic to undergo this assay; whereas, those plates treated with the PAHs at 5.0 µM in the absence of UV light did not exhibit such signs of toxicity.

Keywords: Polycyclic aromatic hydrocarbons, UV radiation, phototoxicity, DNA damage.

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