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TOXICITY OF "LIGHT STICK" SOLUTIONS: DNA ADDUCT FORMATION AND CELL OXIDATIVE DAMAGE

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Chemiluminescent plastic rods, called "light sticks", are used by fishery companies and littered on the shores. Local inhabitants use their contents as repellents, tanning oil, and medicine for joint pain. We have investigated the reactivity of spent light stick solutions collected on Brazilian beaches and the cellular toxicity of their contents as well as that of brand-new light stick solutions. Products of the reaction of the discarded light stick contents with 2'-deoxyguanosine (dGuo) were analyzed by HPLC-UV-ESI-MS/MS. An adduct with m/z 408 $[M+H]^+$ (addition of 140 Da to dGuo) was purified and characterized in a Collision Induced Dissociation (CID) mass spectrometer. HepG2 cells were incubated for 16 h with 0.025 – 2 μ L of light stick solutions: (i) collected on the beaches, (ii) obtained immediately after the chemiluminescent reaction in the laboratory, and (iii) previously the reaction, containing either *n*-butyl-phthalate, diphenylanthracene, and bis(trichlorophenyl)oxalate (solution 1), or H₂O₂ and sodium salicylate (solution 2). Cell survival was evaluated by the XTT, crystal violet dye, acid phosphatase activity, glucose consumption, and lactate dehydrogenase assays performed in 96 well plates. One hundred nL of all solutions was found to significantly kill cells by necrosis. Oxidative damage to cellular DNA was assessed by 8-oxo-2'-deoxyguanosine analysis via an HPLC/EC equipment, which revealed significant increased changes in cells treated with 0.25 μ L of light stick oil in a culture plate of 14 cm diameter. Altogether our data point to important genotoxicity and cytotoxicity of the light stick solutions and alert to public policies to ban their uncontrolled use.

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References

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