Singlet Molecular Oxygen Generated by the reactions of Ozone with 2'-Deoxyguanosine and Polyamines.

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Ozone (O_3) is a potent oxidant that exerts its biological action either directly and/or indirectly. Significant amounts of O_3 can be formed in urban environments. It is well known that in O_3 reactions, singlet molecular oxygen ($^1O_2$) may be formed in high yields. The toxicity of O_3 appears to be due to its ability to promote oxidative damage to important biomolecules. It has been established that O_3 is a powerful mutagenic agent, and the most observed mutation is G:C transversion. This mutation is typical of reactive oxygen species, such as ($^1O_2$). However, the mechanisms by which ozone causes DNA damage have not yet been fully elucidated. In the present work, we investigated the possibility of $^1O_2$ production during interaction of O_3 with the DNA components (dGuo, dAdo, dCyd and dThd) and also with polyamines. The generation of $^1O_2$ was monitored by the detection of its chemiluminescence at 1270 nm. The results show a preferential generation of $^1O_2$ in the reaction of O_3 with purine base when compared with the lower yields obtained with pyrimidine components. The generation of $^1O_2$ during the reaction of O_3 with polyamines, is pH dependent, being favored in alkaline pH.
Through the HPLC-ESI-MS/MS technique, it was possible to detect some dGuo oxidation products, such as, 8-oxodGuo, Oxazolone, Imidazolone, and Spiroiminodihydantoin. These results indicate that O_3 interacts with dGuo generating $^1O_2$, which can further react with dGuo increasing the yield of oxidized products.

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