Radiation-mediated formation of complex damage to DNA: A chemical aspect overview

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During the last three decades, a considerable amount of work has been undertaken to determine the nature, the mechanism of formation and the biological consequences of radiation-induced DNA lesions. Most of the information was obtained via the development of chemical approaches, including theoretical, analytical and organic synthesis methods. Since it is not possible to present all the results obtained in this review article, we will focus on recent data dealing with the formation of complex DNA lesions produced by a single oxidation event, as these lesions may play a significant role in cellular responses to ionizing radiation and also to other sources of oxidative stress. Through the description of specific results, the contribution of different chemical disciplines in the assessment of the structure, the identification of the mechanism of formation and the biological impacts in terms of repair and mutagenicity of these complex radiationinduced DNA lesions will be highlighted.