Development of Chemiluminescent Coelenterazine Derivatives with Anticancer Potential

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Cancer is one of the most challenging diseases in terms of efficient treatments and side-effects. In fact, in 2020, 18.1 million cases were reported worldwide, leading to 10 million deaths [1]. Despite the development of targeted therapies and more effective chemotherapy agents, many patients still lack effective cancer treatment [2], which continues to motivate the pursuit for novel molecules with potential anticancer activity.

Photodynamic therapy (PDT) presents a minimally invasive nature and fewer side-effects, being a potential innovative therapy. In this therapy, a photosensitizer accumulates in tumor site and it is activated by light with specific wavelength. Though, the penetration of light into biological tissues is restricted and this therapy is restricted to treat superficial tumors or tumors in the outer lining of internal organs or cavities [2].

In order to overcome the light-related issues presented by PDT our team have been focused on the design of new strategies for obtaining intracellular PDT effect without external light sources. Based on the chemiluminescence (CL) system of marine Coelenterazine (Clz), we have designed and synthesized Clz-derivatives that act as self-activating photosensitizers and that are activated intracellularly by a cancer marker (superoxide anion).

Cytotoxicity assays with cell lines (breast, prostate, lung and gastric) showed that the novel photosensitizers possess significant toxicity toward tumor cells, while not affecting normal cells. Besides we compared the activity of these compounds with standard treatments, finding a higher cytotoxicity [3-6].

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