New anti-inflammatory and pro-apoptotic photosensitizers against arthritis

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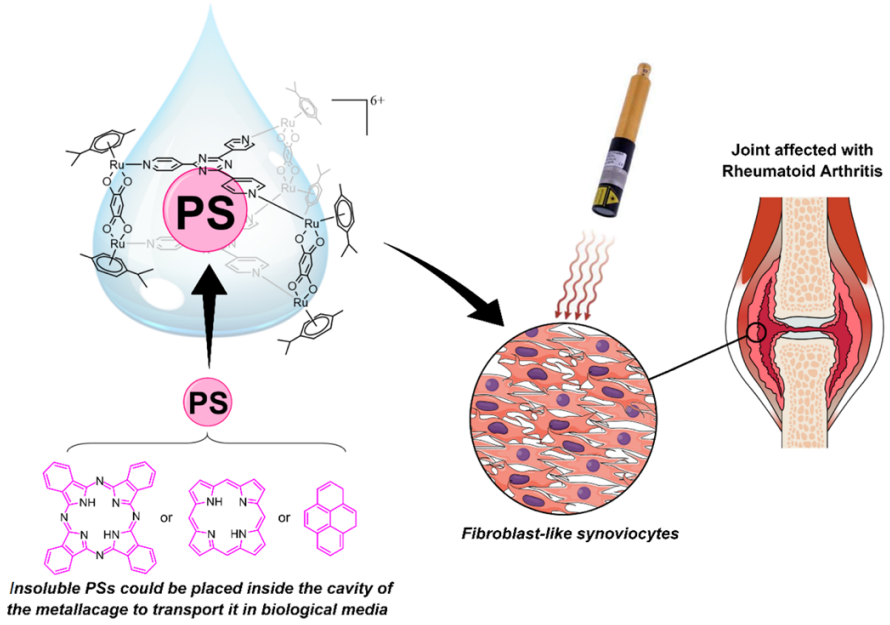
Contrary to popular belief, rheumatoid arthritis (RA) is not a disease only associated with aging, since it can also affect young people.[1] It is an autoimmune pathology that, although mainly affecting joints, can also attack other organs such as kidneys, lungs or heart. If left untreated, it can lead to a serious prognosis.[2] The most common treatment remains synovectomy, which is an invasive treatment and involves long periods of postoperative rehabilitation. In recent years, promising results have been achieved using non-invasive treatments such as anti-tumor necrosis factor drugs, Janus kinase inhibitors, and especially photodynamic therapy (PDT).[3] The latter involves a photoactive compound, a photosensitizer (PS), and light activation. The simplicity and non-invasiveness make PDT an ideal treatment to alleviate the pain or disability caused by RA. Unfortunately, conventional PSs often have some drawbacks related mainly to their low solubility in biological media and undesirable side effects such as light hypersensitivity.[4] We believe that it may be possible to solve the poor water solubility of PSs using ruthenium metallacages. These metallacages are soluble in biological media and have an inner cavity in which the PS can lodge. Such ruthenium metallacages have already been tested *in vitro* on cancer cells, demonstrating their potential.[5]



We have now designed new ruthenium metallacages and tested them as PDT agents against RA. The *in vitro* activity of these PS carriers in human fibroblast-like synoviocytes cells is promising. The anti-proliferative assays are excellent, and now the anti-inflammatory and pro-apoptotic activity of our new ruthenium metallacages-PSs are under investigation. Our most recent results will be presented.

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[3] Gallardo-Villagrán, M., Leger, D.Y., Liagre, B., Therrien, B., *Int J Mol Sci*, **2019**, 20, 3339.
[4] Koderhold, G., Jindra, R., Koren, H., Alth, G., Schenk, G., *J Photochem Photobiol B*, **1996**, 36, 221-223.
[5] Schmitt, F., Freudenreich, J., Barry, N.P., Juillerat-Jeanneret, L., Süss-Fink, G., Therrien, B., *J Am Chem Soc,* **2012**, 134, 754-757.