LOOKING INTO NEW DIRECTIONS FOR GLYCONANOMATERIALS: GLYCO-NANORADIOSENSITIZERS FOR PRECISION RADIOTHERAPY IN CANCER

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Glyconanomaterials clearly emerged as appealing tools with an immense potential in nanomedicine applications. Their implications in a wide range of biomedical investigations (i.e. studies of glycans-lectins interactions, development of cancer/pathogens vaccine prototypes and precision drug delivery systems, to mention some) stem for their unique properties [1]. The list of glyconanomaterials available to date is quite extensive and the huge amount of knowledge collected so far in this field has the potential to open new perspectives for such tools.

In this framework, we have recently reported on a modular, and functional glyconanomaterial that combines the complementary properties of a polysaccharide-based nanomaterial, the cellulose nanocrystal (CNC), with small-sized gold nanoparticles (AuNPs) which are stably embedded into the CNC matrix. It is a versatile glyconanomaterial that provides a conceptual advance in the field: it can be prepared on a scale of grams, and its surface is easily engineered with structurally different bioactive headgroups and with high batch-to-batch reproducibility [2-4].

In this presentation, we describe how the peculiar structure of our CNC-AuNPs allowed us to investigate its versatility in either conventional or more advanced applications. In particular, we will discuss in detail one of our *business cases*: its implication as nanoradiosensitizer in precision radiotherapy in oncology. The combination of X-rays and the CNC-AuNPs sensitizes radioresistant tumors to radiotherapy treatment and, notably, allows us to use half a dose of radiation with the same therapeutic effect [4].

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