Sugar-based supramolecular gelators as scaffolds for neuronal cell growth

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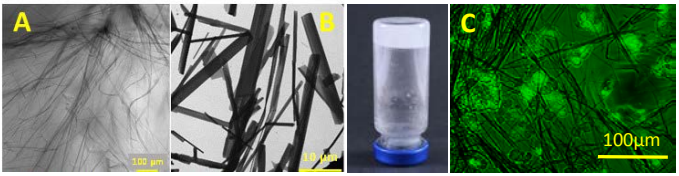
Currently, most of the scaffolds for 3D-cell growth are based on synthetic or natural polymers. Colloidal soft materials such as low molecular weight (LMW) supramolecular gelators, which are not polymers, are not widespread for these applications, but however are emerging in this field [1-3]. LMW gels can display a variety of supporting fibres morphologies, with various size, shapes, helicity, roughness, local stiffness and cross-links topology (Fig A-B). The aim of this work is to explore the impact of these specificities on neuronal cell growth.

For this purpose, three sugar-based supramolecular gelators differing only by a one-carbon increment on their alkyl chain length have been prepared and analysed by optical, confocal, electronic microscopy and ImageJ (Fig. A-B-C) [4]. Mechanical properties have been analysed by rheology and uniaxial compression tests. The cell growth, cell adhesion, morphology and spreading of a neuronal cell line have been studied using a cell viability kit (Fig. C), MTT assay, immunostaining, optical microscopy and confocal microscopy.



The three LMW gelators studied provided gels with remarkable different morphologies and mechanical properties, despite their tiny chemical structure difference. Concomitantly, significant differences in growing the neuronal cells have been observed depending on the gelator. Only one of the three gel enabled a reproducible and important growth of the cells.

These results introduce the use of simple sugar-based supramolecular gelators as scaffolds for cell growth. They display an original combination of micro/macro mechanical properties. They also highlight how a tiny difference in chemical structure can have a strong impact on the scaffold morphology and the cell viability and growth.

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