**Nanocrystalline Particles for Earlier Detection of Neurodegeneration**

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**Introduction**

Over the past few decades, there has been a rapid growth in nanoparticles (NPs) discovery and their use for medical therapy and diagnostics [1,2]. Nanoparticles based on the crystalline matrix of sodium fluoride have a pronounced ability to host functional ions, such as lanthanide ions. Gadolinium-doped nanoparticles (Gd NPs) have proven to function as an enhanced contrast imaging agent for magnetic resonance imaging (MRI) [3].

**Aims**

Develop and characterise Gd-doped NPs for non-invasive detection of the brain neurodegeneration using MRI.

**Methods**

In this work, we developed ultra-small Gd-doped nanocrystals as a potential MRI contrast agent. We established a surface functionalization protocol to stabilize NPs in biological media. Furthermore, we characterised relevant paramagnetic properties using MRI. Cellular tolerance was performed with primary cortical neurons, neuron-related cell lines, and neuron-derived spheroids.

**Results**

We synthesised Gd-doped nanocrystals with a size of 20± 5 nm and developed a polymer-based coating with biocompatible properties. We confirmed that Gd NPs could be uptaken and well-tolerated by neuronal cells at appropriate dosages.

**Conclusion**

Overall, our results show the potential of using Gd NPs as a novel MRI contrast agent for non-invasive detection of Alzheimer’s disease.

**References**

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