Gold–polymer complexes for the treatment of rheumatoid arthritis

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Auranofin (Scheme 1) is a gold complex administered orally for the treatment of rheumatoid arthritis.\(^1\) Its effectiveness, however, is inferior to that of similar injectable gold complexes which are polymeric in nature.\(^2\) We propose that a micellar system with Auranofin conjugated to the core of the micelle will offer enhanced performance over the monomeric drug.

![Scheme 1](image1)

A new thioglucose-based monomer (Scheme 1) was synthesized by acetylation of \(\beta\)-glucose, introducing a \(\beta\)-thiol in the anomeric position and an acrylate group in the 6-position. A pyridyl disulfide protecting group was chosen for the thiol. RAFT polymerisation successfully yielded a homopolymer which was reduced to present free thiols on the pendant sugar units. The complexation of chloro(triethylphosphine)gold(I) to the sugar units was successful, generating a polymeric Auranofin analogue (Fig. 1).

A second monomer more closely mimicking Auranofin was developed with a thioacetate in the anomeric position. Chain extension of a poly(PEGMEA) macroRAFT agent generated amphiphiles capable of complexing gold and self assembling into core-shell structures with the Auranofin in the core.

![Figure 1. SEC traces of the homopolymer before reduction, after reduction, and after complexation of gold.](image2)

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**Research Interests**
- RAFT, glycopolymers and dendrimers, light responsive polymers