Theranostic porous silicon nanoparticles for personalised treatment of thrombosis

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Acute thrombosis is one of the leading causes of mortality and morbidity in both developed and developing countries, placing a huge burden on health and economic systems.[1] Recent reports of widespread COVID-19 related thrombosis have highlighted the need for improved approaches to diagnosis and treatment.[2] Current diagnostic techniques suffer from a lack of speed and sensitivity, and treatment is associated with severe bleeding side effects. Here, theranostics, or the combined delivery of diagnostic and therapeutic moieties, may improve patient outcome by increasing the precision and efficacy of diagnosis and treatment, enabling personalised medicine. Leveraging sophisticated nanomedicine may further improve treatment by improving the nanoparticle's pharmacokinetics.[3] Porous silicon nanoparticles were utilised as a scaffold due to their biodegradability and high loading capacity. Then the addition of targeting ligands (peptide or single-chain antibody) facilitated targeting with high specificity. Finally, several methods for radiolabelling with various radioisotopes (^{64}Cu, ^{68}Ga, and radioiodine) were investigated to enable PET/CT imaging, providing rapid and sensitive diagnosis using a widely available clinical imaging modality. It is expected that the imaging and theranostic nanoparticle systems produced may enable superior management of thrombosis compared to currently clinically utilised approaches.

References:
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