Nanomedicine and Nanoscale Delivery VII

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Yttrium-90-doped biocompatible metal-organic frameworks for low-dose rate internal radiation therapy

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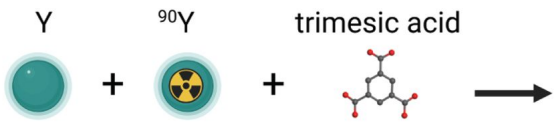
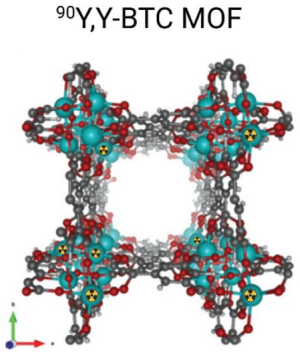
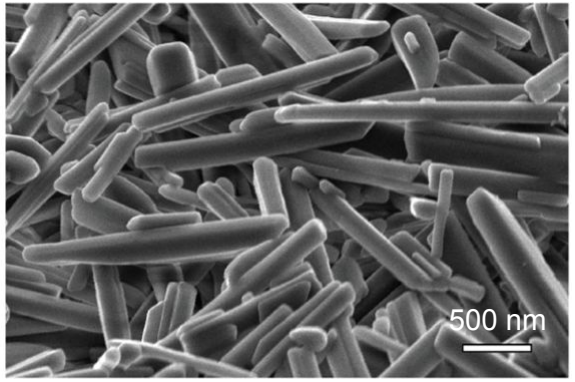
Here, we developed slowly biodegradable, biocompatible and injectable nano- and microparticles containing beta-emitter yttrium-90 based on either the mesoporous Y-doped iron-based metal-organic frameworks MIL100(Fe,Y) or the microporous Y-based MOFs (Y-BTC), and evaluated their potential for Low-Dose Rate (LDR) internal radiation therapy.

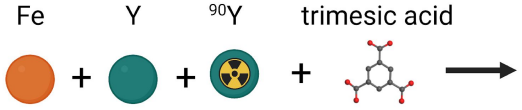
- **^{90}Y,Y-BTC**

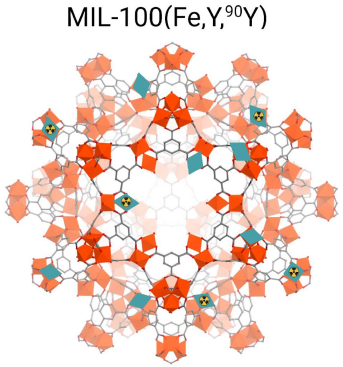


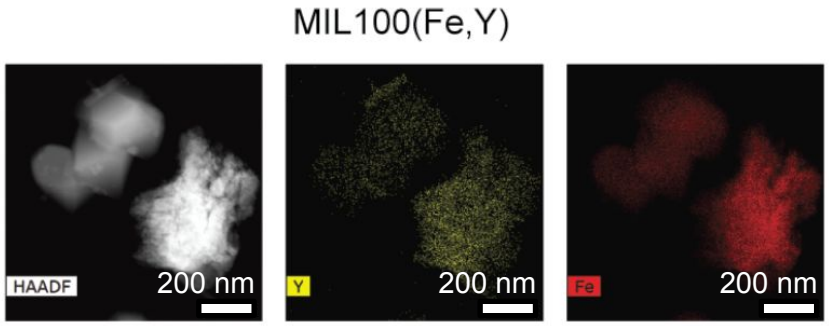


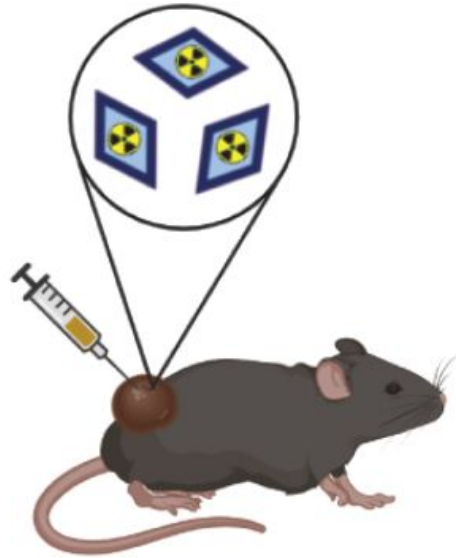


- **MIL100(Fe,^{90}Y,Y)**









Intratumoral injection of MOF nanoparticles

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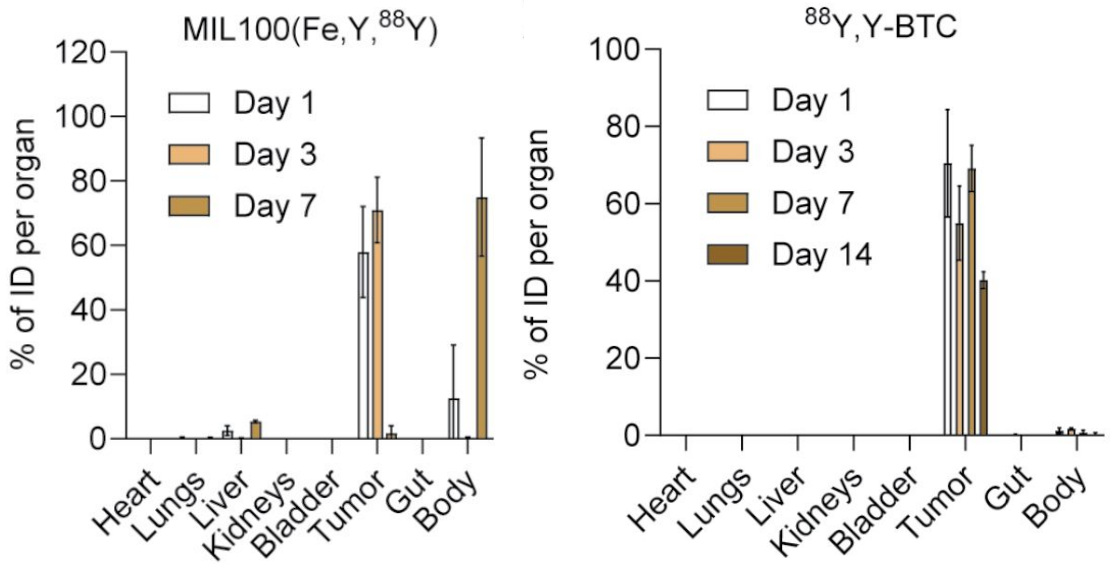
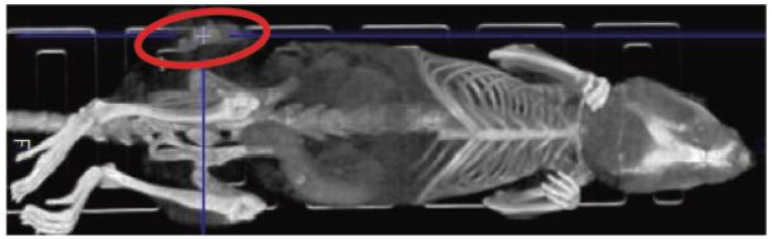
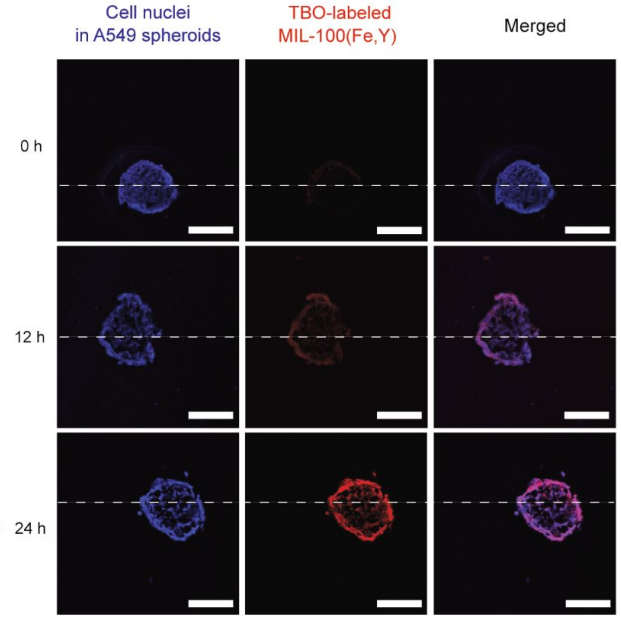
Radioyttrium retention after intratumoral injection of MIL100(Fe,^{88}Y,Y) nanoparticles and ^{88}Y,Y-BTC microparticles

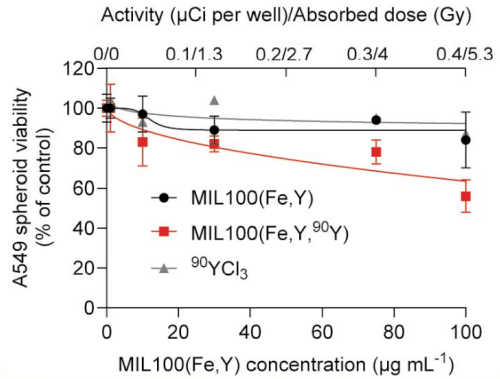


Day 7, Y-BTC

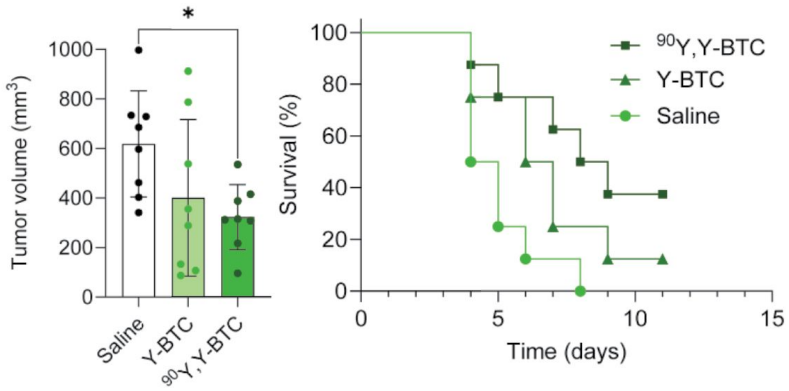


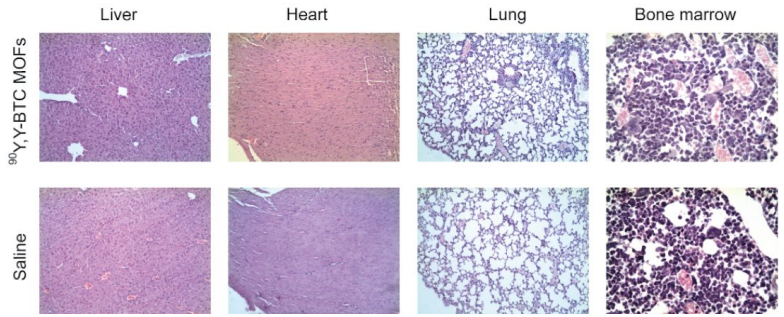
MIL100(Fe,^{90}Y,Y) nanoparticles in A541 spheroids





^{90}Y,Y-BTC microparticles after injection to B16F1 tumors





Conclusion: We have shown feasibility to prepare radioactive yttrium-90 containing biodegradable poorly toxic MOF particles that are advantageous for a low-dose rate internal radiation therapy.