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VASCULAR DISEASES

Shear-thinning biomaterial for endovascular embolization

Metallic coils that are used for the embolization of injured vessels are associated with complications such as coil migration and compaction, breakthrough bleeding, and toxicity. A shear-thinning biomaterial described in *Science Translational Medicine* was found to be a safe and viable alternative to coil embolic systems for endovascular embolization procedures.

Avery and colleagues sought to design an endovascular agent that could be rapidly deployed, prevent bleeding recurrence, create a cast of the vessel or aneurysm, and be useful in challenging clinical situations. They engineered and tested a shear-thinning biomaterial made up of a nanocomposite hydrogel that contained gelatin and silicate nanoparticles. The shear-thinning biomaterial showed similar haemostatic activity to clinically used metallic coils, the standard treatment for endovascular embolization. When injected *in vitro* or *in vivo*, the biomaterial completely conformed to the lumen contours to occlude the vessel. Consequently, incomplete occlusion was not a concern with this biomaterial, as it can occlude the vessel without relying on intrinsic thrombus formation, unlike in coils. Furthermore, the biomaterial withstood physiological pressures, and did not fragment or displace within the vessel when injected *ex vivo*.

"We have generated a promising gel-based embolic agent that can be rapidly deployed from preloaded sterile syringes, completely occludes targeted arteries and veins, shows no indications of recanalization after injection, and is capable of performance in anticoagulated blood or in coagulopathic scenarios," explain the investigators. "This study sets the stage for future studies and clinical trials to investigate the potential of shear-thinning, *in situ* gelling hydrogels in the management of vascular injuries or abnormalities and other conditions requiring endovascular embolization".

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ORIGINAL ARTICLE Avery, R. K. *et al.* An injectable shear-thinning biomaterial for endovascular embolization. *Sci. Transl. Med.* **8**, 365ra156 (2016)