New system may one day steer microrobots through blood vessels for disease treatment

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Researchers use a magnetic field to generate both side-to-side and corkscrew-like motions of tiny robots.

Microscopic-scale medical robots represent a promising new type of therapeutic technology. As envisioned, the microbots, which are less than one millimeter in size, might someday be able to travel throughout the human bloodstream to deliver drugs to specific targets or seek out and destroy tumors, blood clots, and infections that can't be easily accessed in other ways.

One challenge in the deployment of microbots, however, is developing a system to accurately "drive" them and maneuver them through the complex and convoluted circulatory system, to a chosen destination. Researchers from Korea's Hanyang University in Seoul and Chonnam National University in Gwangju now describe, in the AIP's *Proceedings of the 56th Annual Conference on Magnetism and Magnetic Materials*, a new navigation system that uses an external magnetic field to generate two distinct types of microbot movements: "helical", or corkscrew-like, motions, which propel the microbots forward or backward, or even allow them to "dig" into blood clots or other obstructions; and "translational," or side-to-side motions, which allow the 'bots to, for example, veer into one side of a branched artery.

In lab tests, the researchers used the system to accurately steer a microbot through a mock blood vessel filled with water. The work, the researchers say, could be extended to the "precise and effective

manipulation of a microbot in several organs of the human body, such as the central nervous system, the urinary system, the eye, and others."

More information: "Magnetic Navigation Systems for the Precise Helical and Translational Motions of a Microrobot in Human Blood Vessels" is part of the Proceedings of the 56th Annual Conference on Magnetism and Magnetic Materials, to be published in the *Journal of Applied Physics* in April.

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