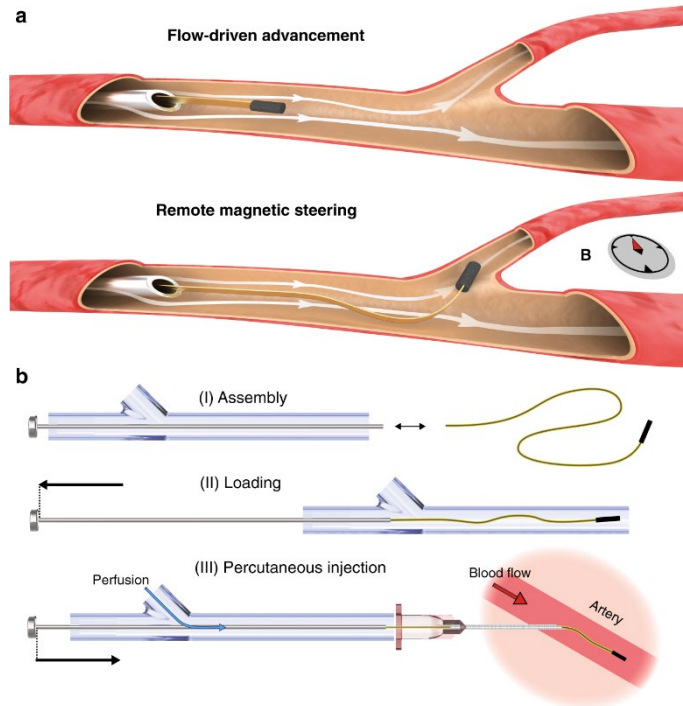


# Ultraflexible flow directed device



Ref. Nr

6.1981

Keywords

Catheter, guidewire, magnetic steering, vascular device, minimally-invasive interventional radiology

Intellectual Property

WO2021/009615

Publication

Pancaldi, L., Dirix, P., Fanelli, A. et al. Flow driven robotic navigation of microengineered endovascular probes. Nat Commun 11, 6356 (2020).

<https://doi.org/10.1038/s41467-020-20195-z>

Date

12/12/2024

## Description

The invention is rooted in advancing catheterization methods, traditionally reliant on the Seldinger technique, which employs mechanical force to insert and navigate devices in blood vessels. Limitations of existing methods, including rigidity versus flexibility trade-offs and challenges with tortuous or miniaturized vascular pathways, led to the development of flow-assisted and magnetic catheters. Despite these innovations, issues such as reliance on mechanical pushing and size constraints persist. This invention introduces a flow-directed device that entirely relies on blood flow for navigation, eliminating the need for pushing mechanisms. It incorporates a magnetic tip for external guidance, enabling precise navigation in microvascular networks.

## Advantages

This flow-directed device overcomes key challenges of prior solutions. Its minimally invasive design ensures safer navigation without damaging vessel walls. By leveraging blood flow, it achieves rapid transit to target sites, reducing surgical time and associated risks. The magnetic

guidance system enhances control at vessel bifurcations, offering precision and adaptability for complex pathways. The ultra-flexible and miniaturized structure, engineered with advanced materials, ensures compatibility with diverse vascular geometries while avoiding buckling or kinking. This design enables unprecedented access to intricate areas of the body, supporting both in vivo and in vitro applications.

## Applications

- **Medical Procedures:** Navigating microvascular systems during minimally invasive surgeries.
- **Diagnostics:** Deploying sensors for in vivo monitoring or targeted drug delivery.
- **Research:** Facilitating on-chip applications and in vitro vascular studies.
- **Endoscopy:** Exploring and analyzing confined bodily regions.
- **Treatment Delivery:** Precisely reaching difficult-to-access areas for localized therapies.