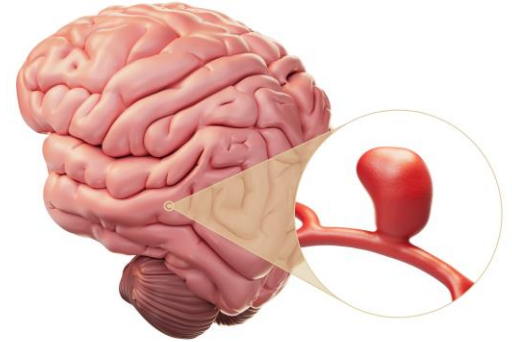


# Isolation and Focal Treatment of Brain Aneurysms using Interfacial Fluid Trapping

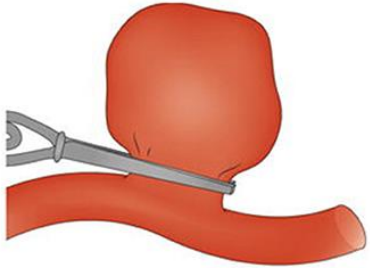
Maria Khoury, PhD

# Cerebral Aneurysms

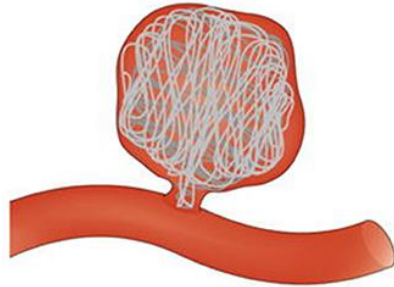
- Blood filled saccular lesions
- ~ 170 million people worldwide
- Only 0.2% rupture but high mortality



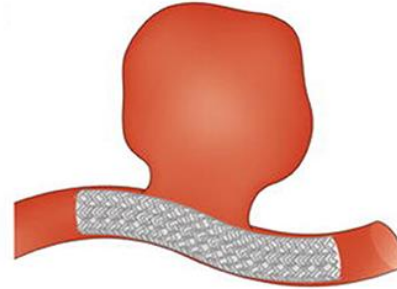
# Current Interventional Treatment Methods



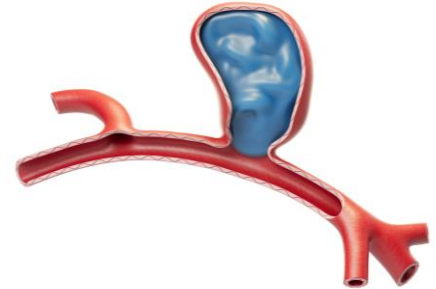
**Surgical Clipping**



**Coiling**



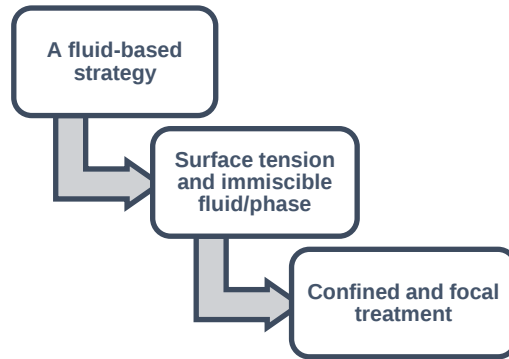
**Flow Diverter**



**Biodegradable  
Materials**

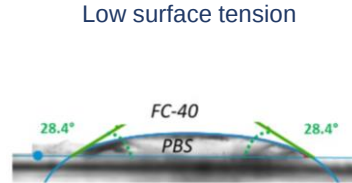
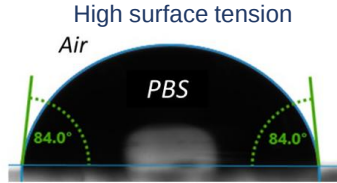
*Ngoepe et al (2018)*

A fluid-based strategy for localizing intravascular therapeutics that leverages surface tension and immiscible fluid/phase interactions to allow confined and focal treatment at brain aneurysm disease sites.

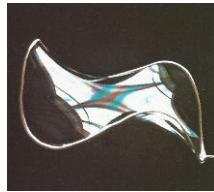




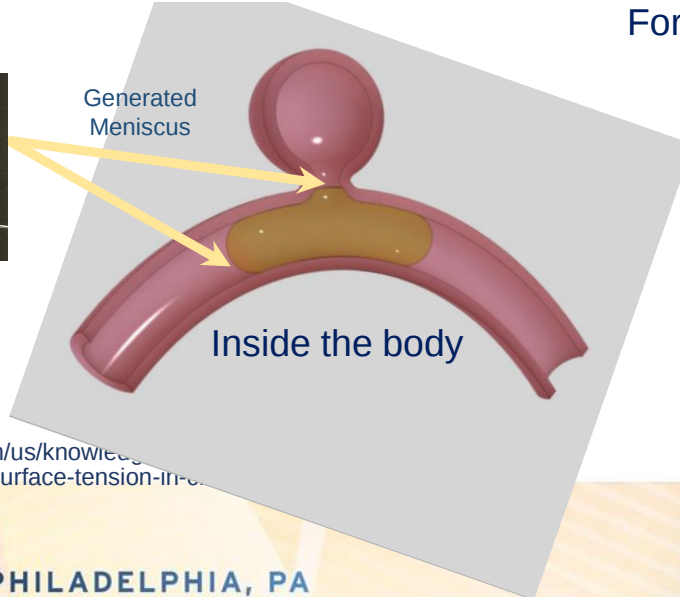
# Surface Tension



Formation of water droplets



Generated Meniscus

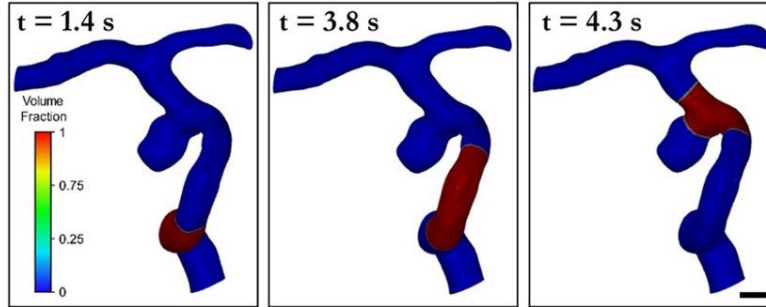


Bugs walk on water

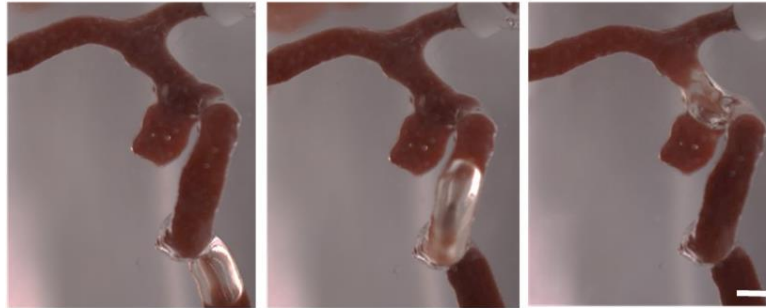
<https://www.dataphysics-instruments.com/us/knowledge-center/surface-tension>  
<https://www.thoughtco.com/definition-of-surface-tension-in-physics>

# Surface Tension-based Isolation of Patient Specific Aneurysm Cavities

CFD

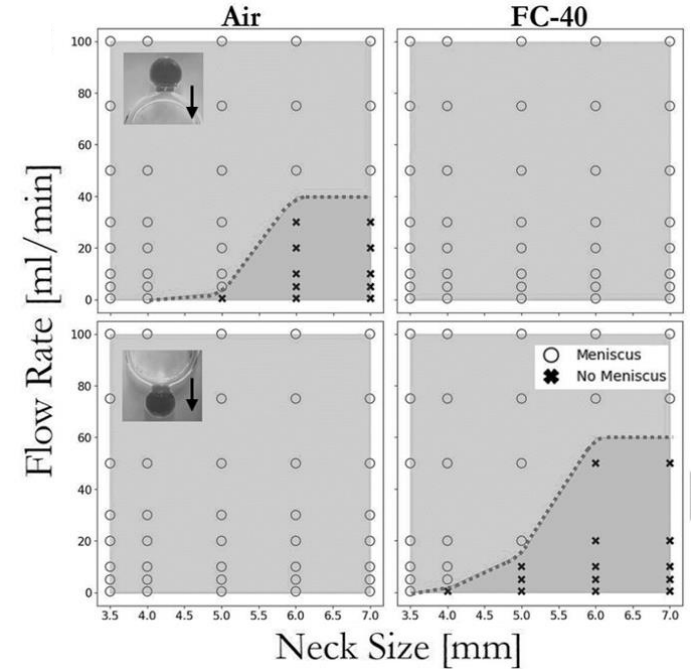
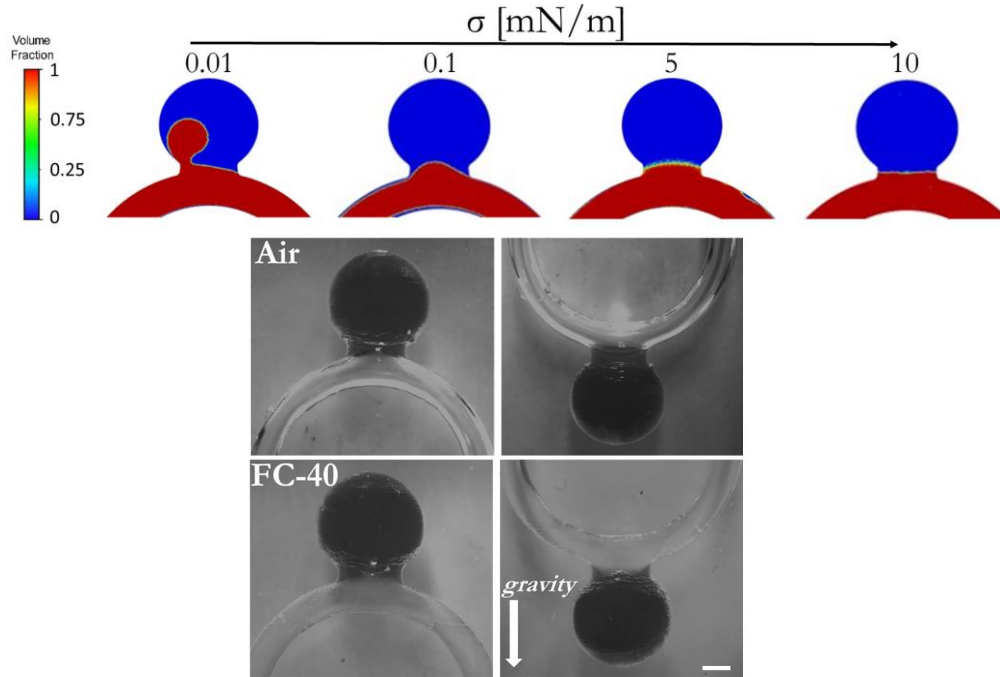


*in vitro*



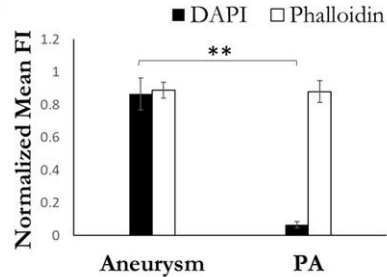
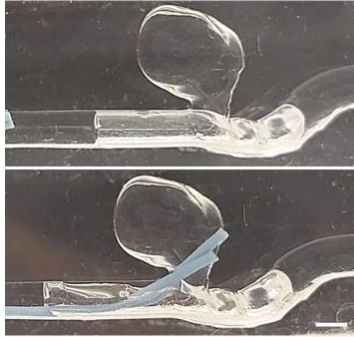
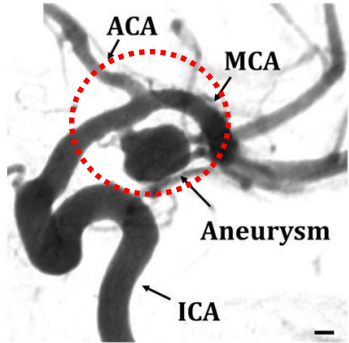
Khoury *et al.* Science Advances (2024)

# Robustness of The Generated Meniscus

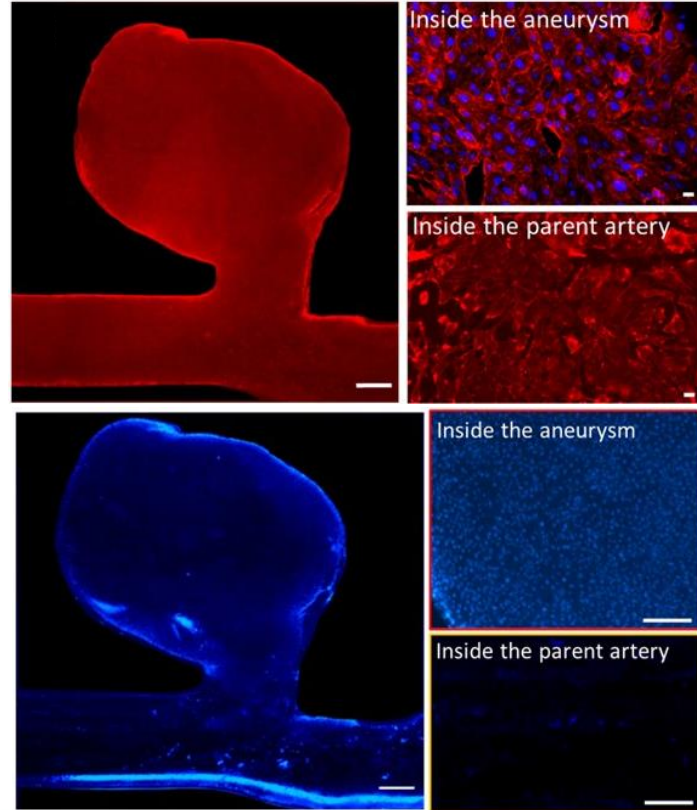


Khoury et al. Science Advances (2024)

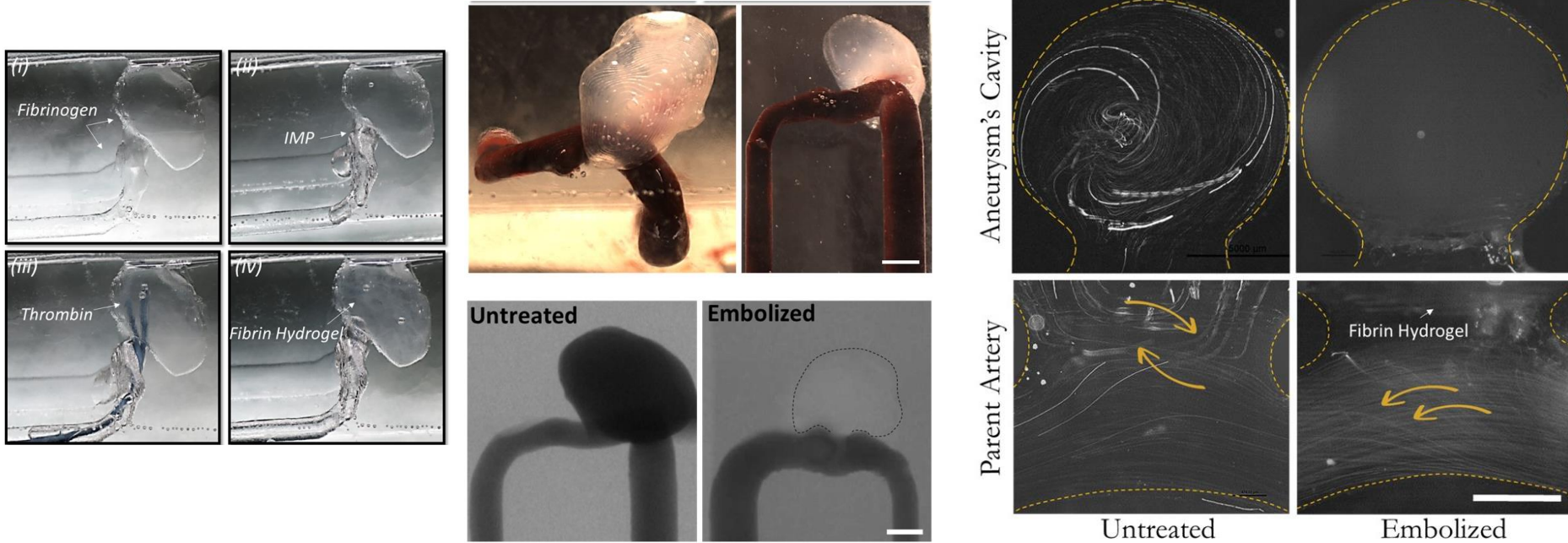
# Fluid Trapping and localized therapeutics in an IMP confined aneurysm



Khoury et al. Science Advances (2024)



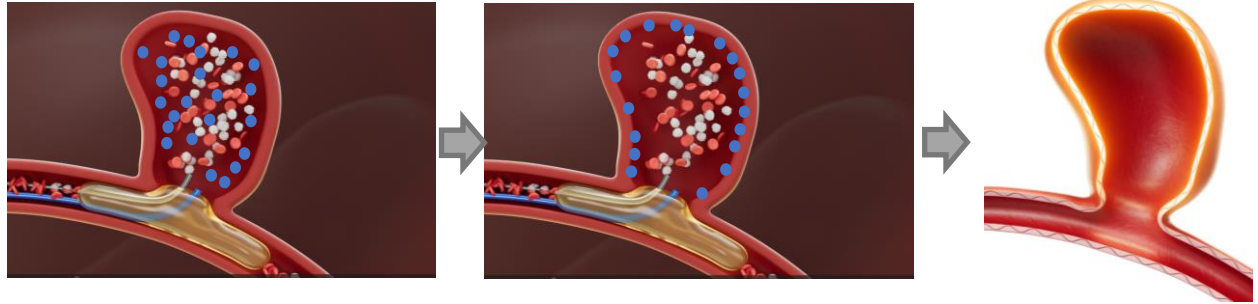
# Embolization of Surface-Tension Isolated Aneurysms



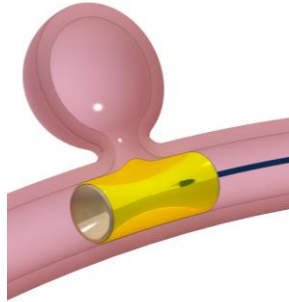
Khoury et al. Science Advances (2024)

# Future Work

- ✓ Drug and gene therapy



- ✓ The VasoSurfer device



- ✓ *In vivo* Experiments

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**Korin Lab - Technion**

