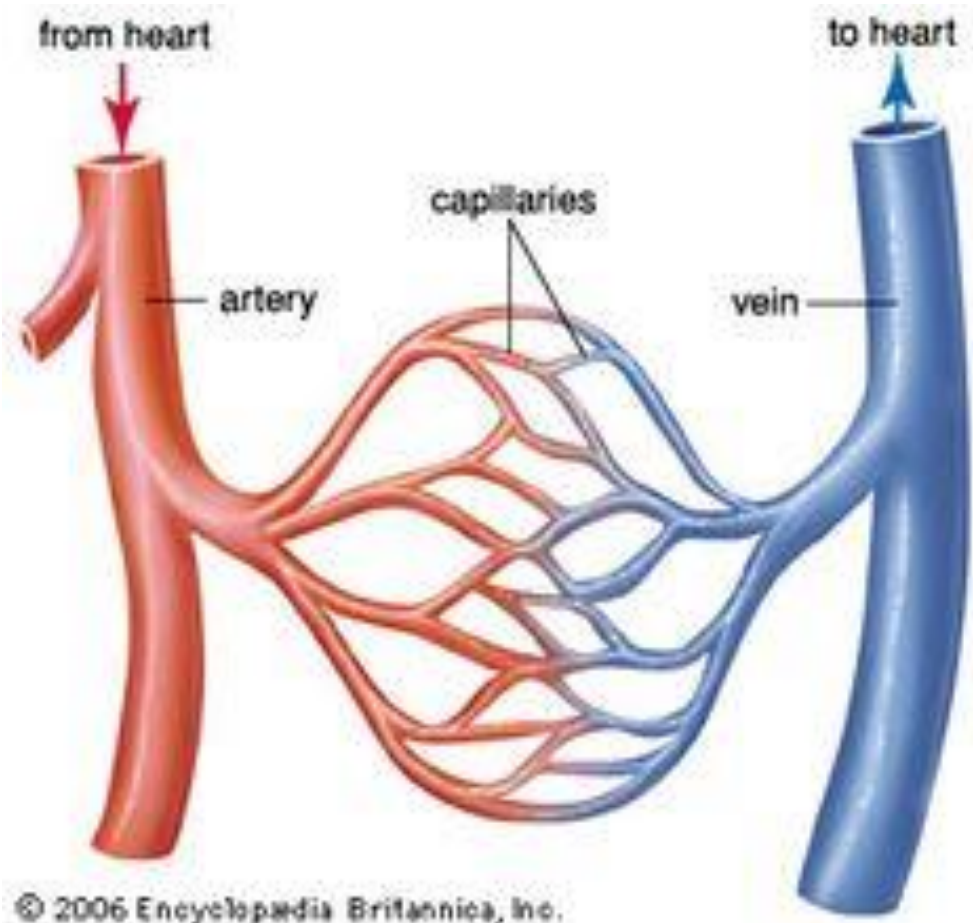


Microfluidics for the World

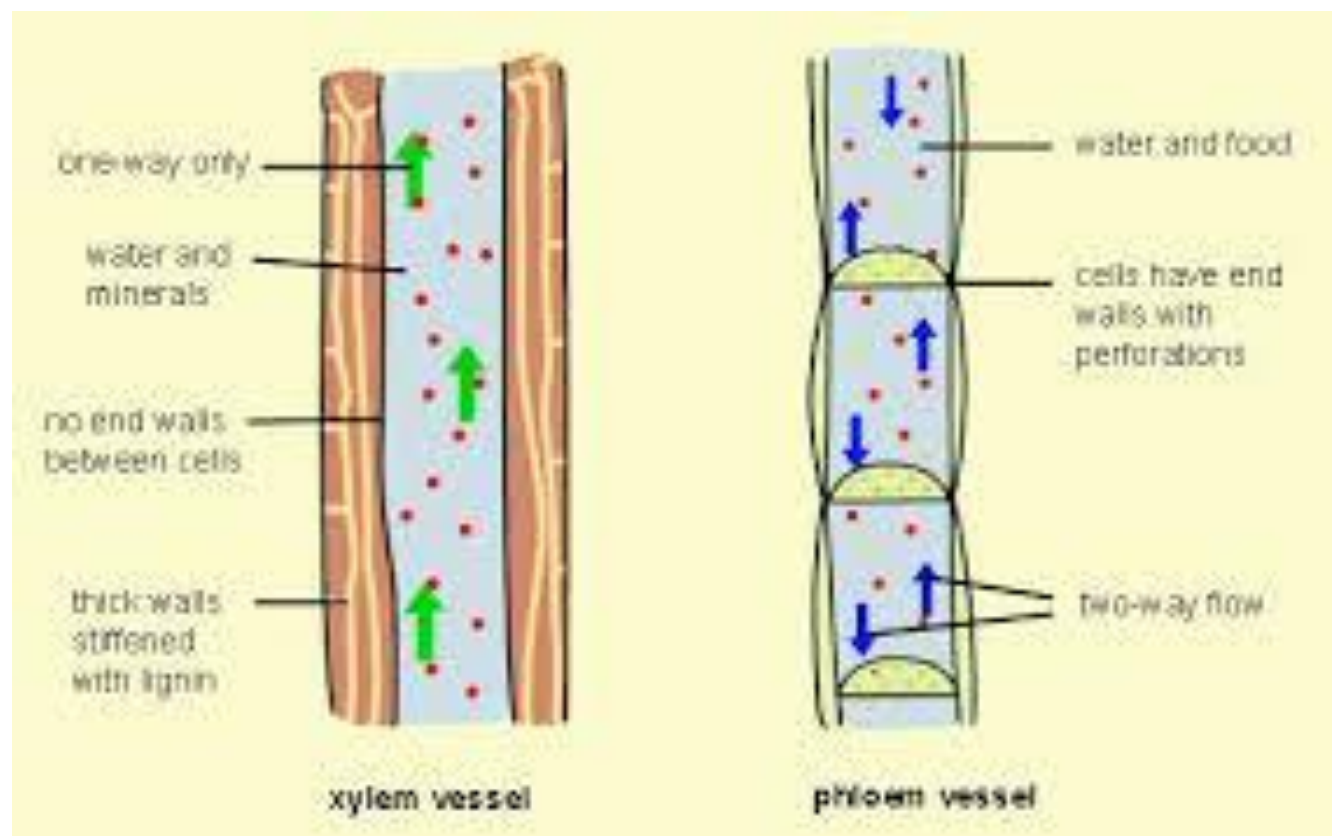
John Sebastian

College of Engineering Trivandrum

PATW- 2016



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MICRO FLUIDICS

CHEMISTRY

PHYSICS

BIOCHEMISTRY

BIOLOGY

BIOTECHNOLOGY

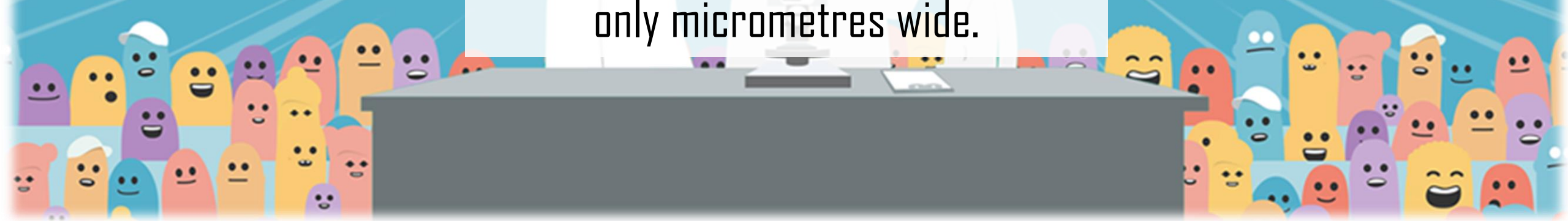
MICROBIOLOGY

MATH

MICRO- AND
NANOTECHNOLOGY

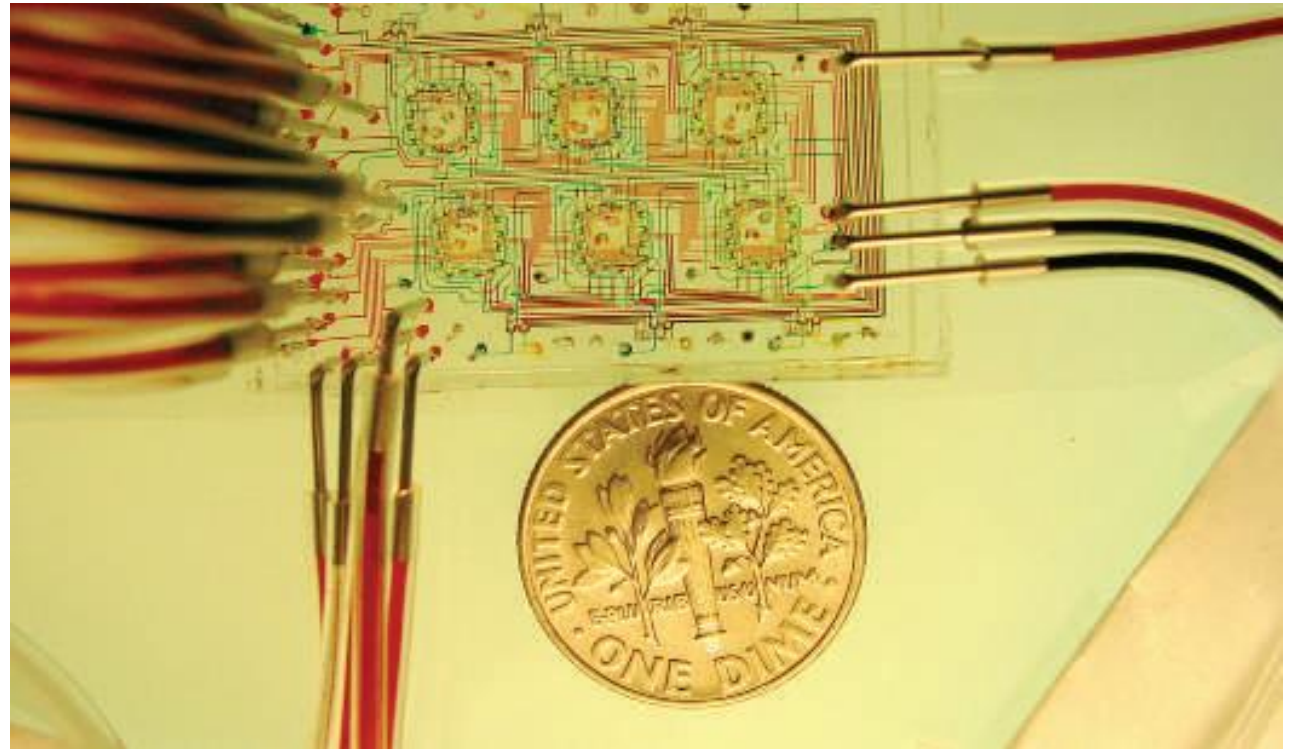
OPTICS

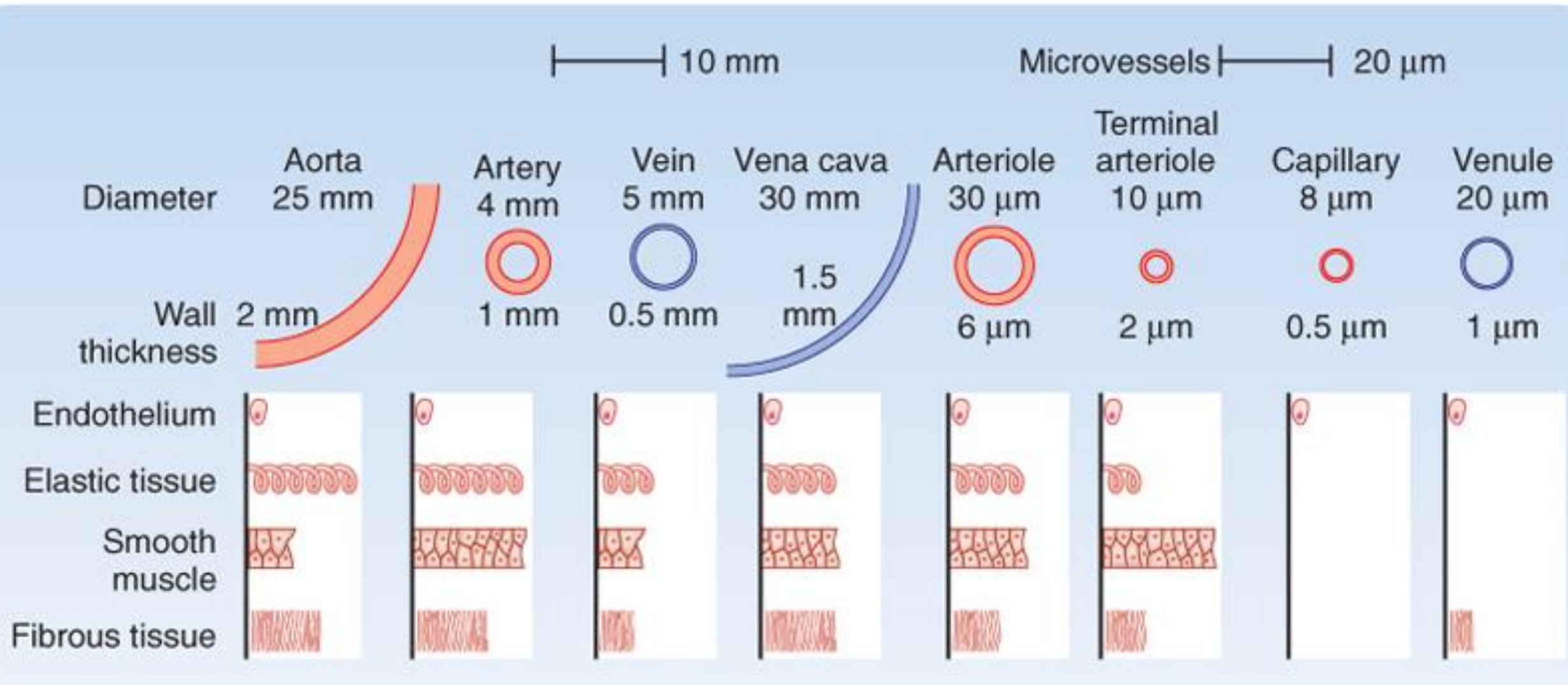
The science and technology of systems that process or manipulate small amounts of fluids, using channels only micrometres wide.



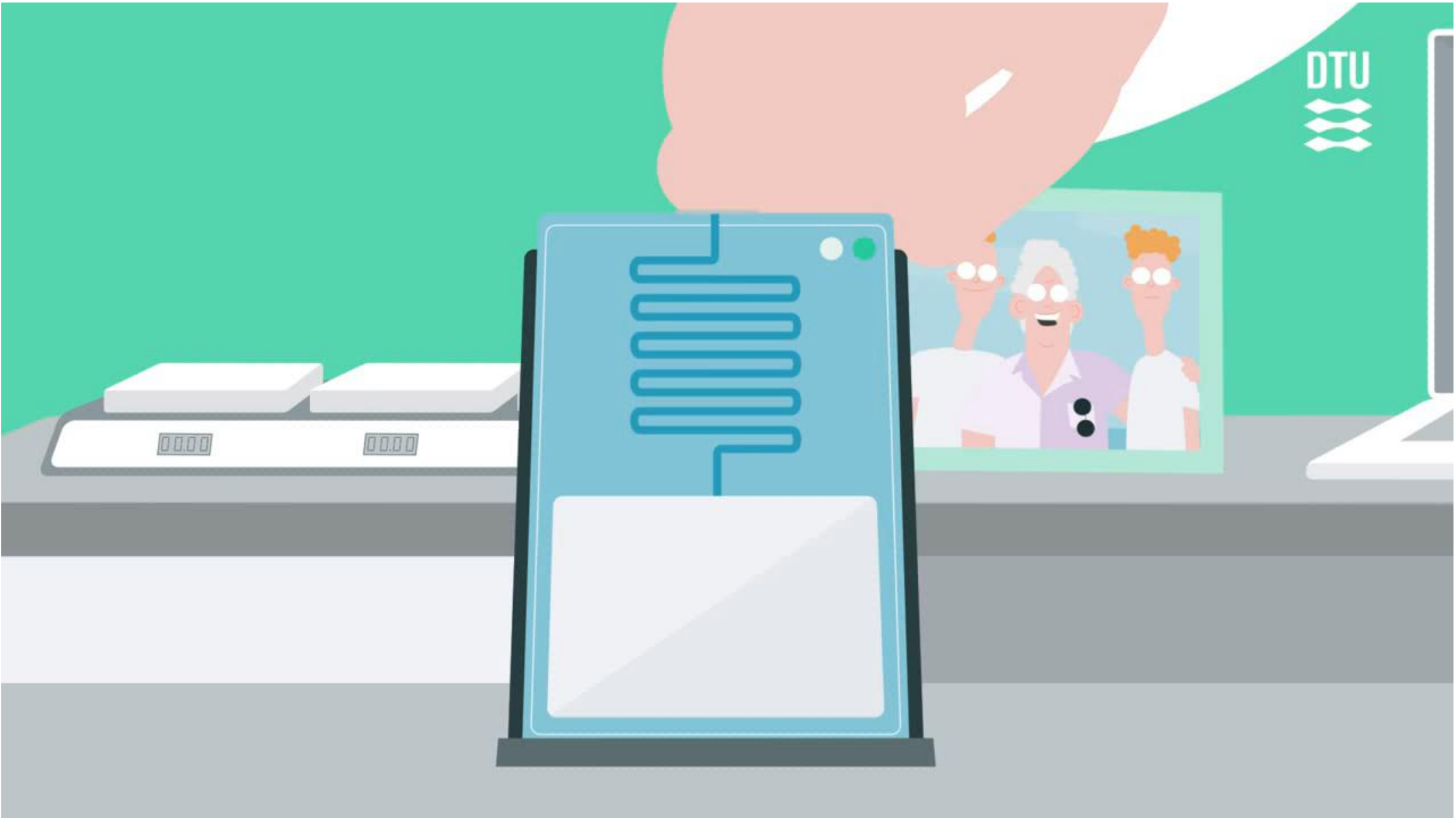
Esoteric Details

- Micro channels- tens to hundreds of micrometers
- Mesoscale- 10 microns to 1mm
- 10^{-9} to 10^{-18} liters.
- Microfluidics has four parents:
 - molecular analysis
 - biodefense
 - molecular biology
 - microelectronics.



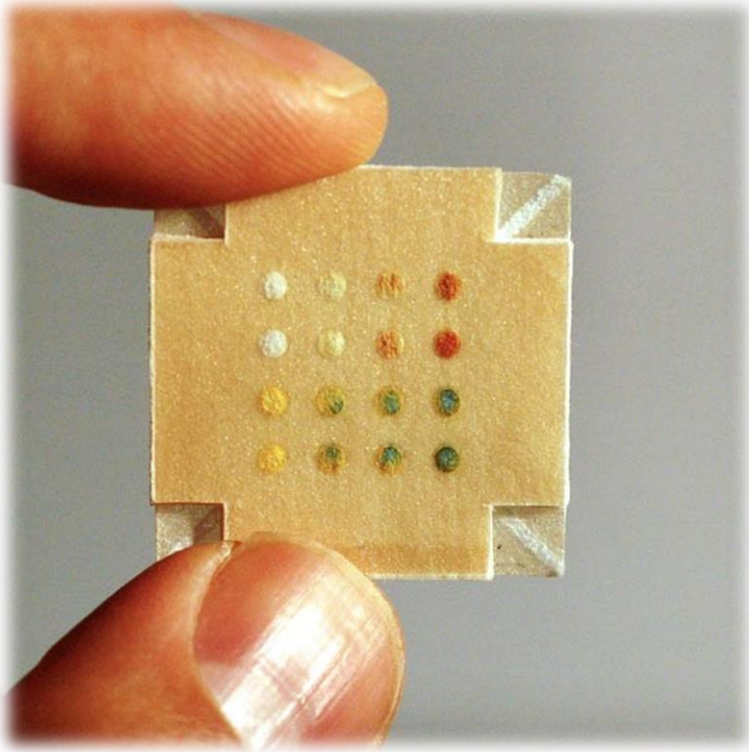


Koepfen & Stanton: Berne and Levy Physiology, 6th Edition.
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DTU

Blood Vessels



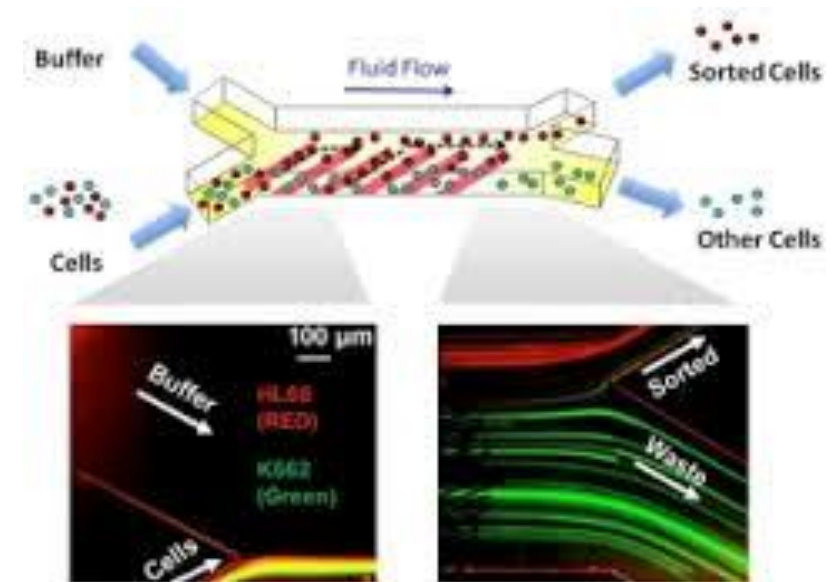
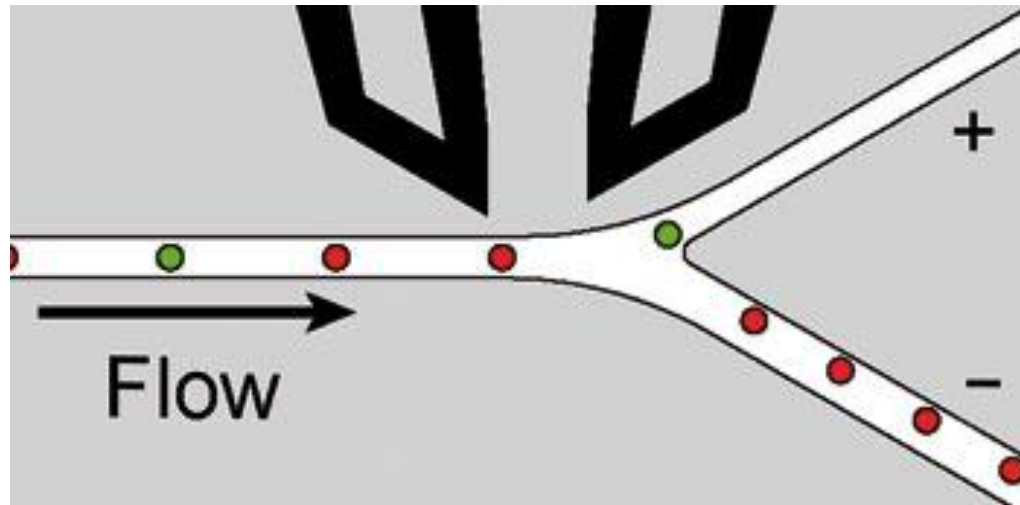
Blood tests rely on colour changes.

1. blood group
2. pathogenic presence
3. diabetes
4. presence of chemicals

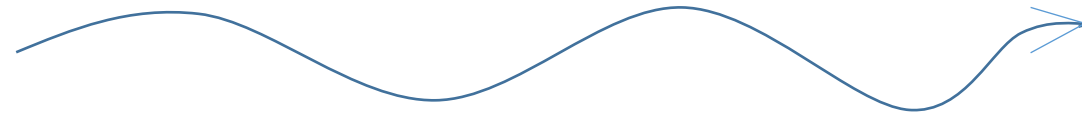
Smaller quantities of chemical reagents and just one drop of blood.

Blood Vessels

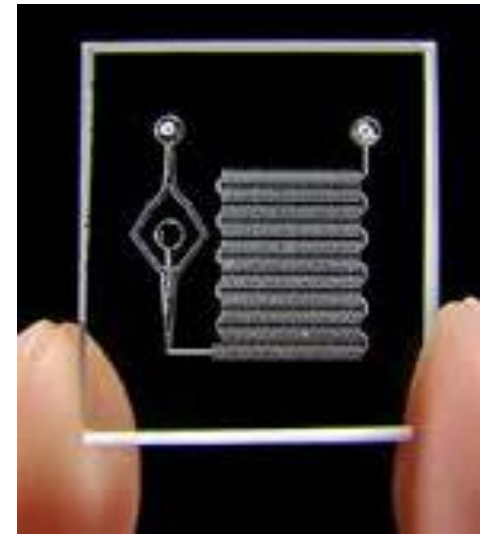
- Cancer cells move about in the bloodstream due to metastasis.



- Diagnosis by CELL SORTING



Lab on a Chip

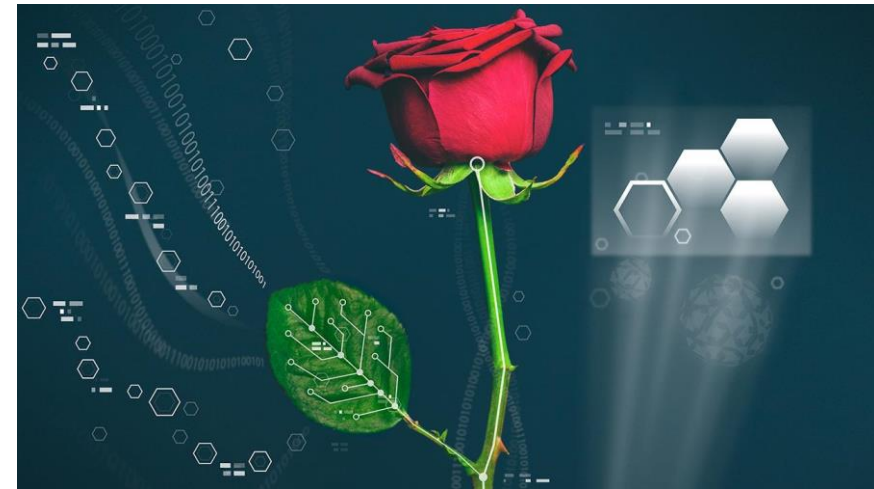
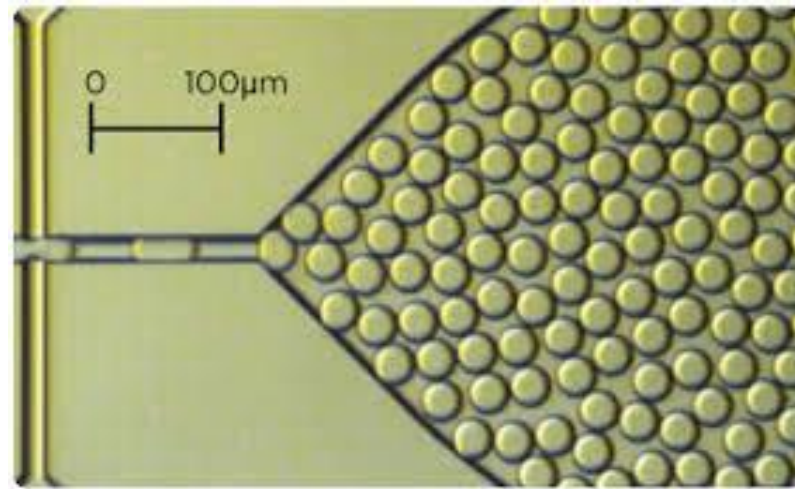


1. Bioreactor
2. Fluid flow and thermal study
3. DNA sequencing
4. Local Assistance Systems
5. Stem cell culture...



launchpad

- Electrical conduction in plants
- Droplet computer
- DNA manipulation
- Less testing on animals



With the microscope we got a closer look, now with the microchip we are able to touch.

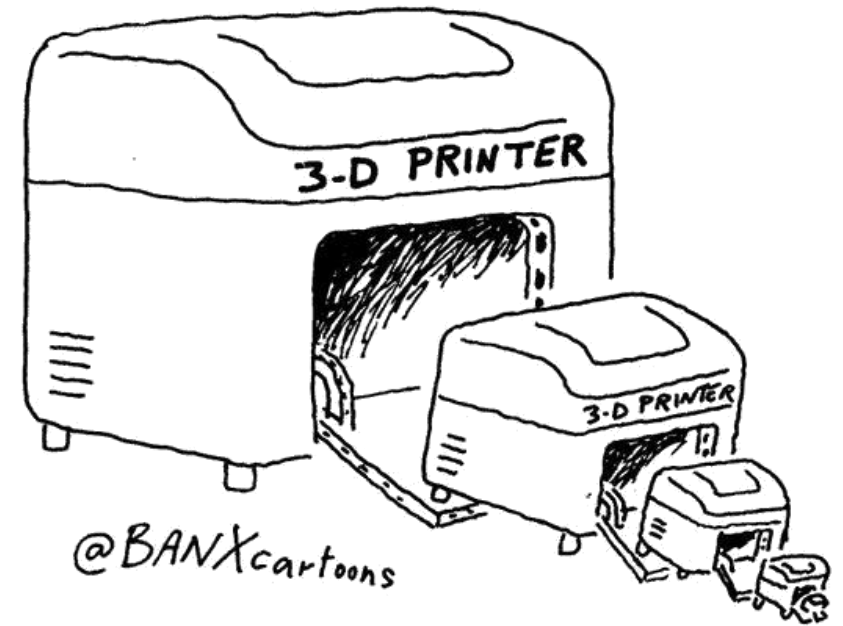
Roadblocks

- Micro fabrication techniques
- Material science
- Cost of machinery

Road ahead

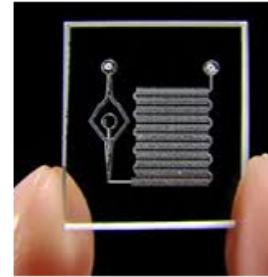
Development of disruptive technologies such as

- 3D printing
- Soft lithography
- Photo lithography....





μ fluidics



References

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AW Martinez, ST Phillips, GM Whitesides... - Analytical ..., 2009 - ACS Publications
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5. Lowe, H. & Ehrfeld, W. State-of-the-art in microreaction technology: concepts, manufacturing and applications. Electrochim. Acta 44, 3679–3689 (1999).

Thanks to

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2. Family
3. You