



From Pressure to Physiology: How Fiber Optic Sensors Enable Smarter Medical Devices

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2026-09-21

EPIC Online Technology Meeting on Fiber for Medical Applications

Resonetics Québec - Who We Are?

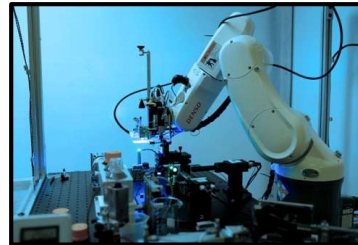
- Based in Québec, Canada (*FISO* acquired by *Resonetics* 2021)
- **Design, manufacture & market FOS** for more than **30 years**
- **>4 Millions FOS** & >150,000 Modules sold worldwide
- Medical Device OEM partner: From sensor design to custom assembly and volume manufacturing
- Main markets & Technologies:
 - **75% Medical** (F-P, GaAs)
 - **25% Energy** (GaAs, *Raman*)

- ISO certified



Éric Pinet – Resonetics (Quebec)

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Why OFS in Medical Devices?



Unaffected by RF
EMI or Microwaves



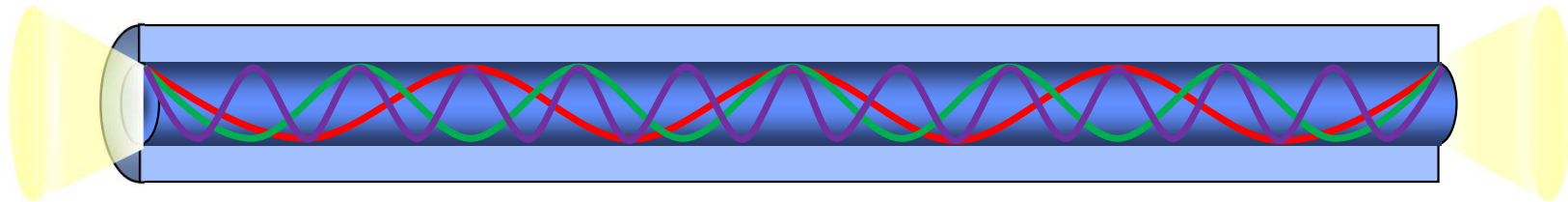
Immune to
High Voltage



Transparent to
Magnetic Field



Tolerant to
Radiations



Intrinsically
Safe



Inert
Chemically



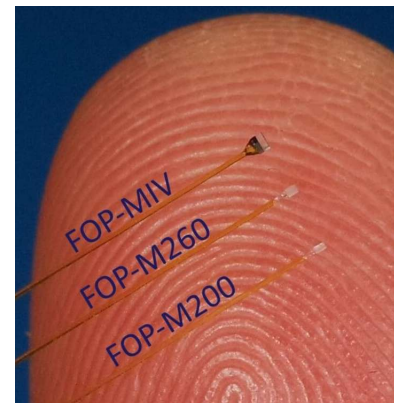
Biocompatible



Low
Drift



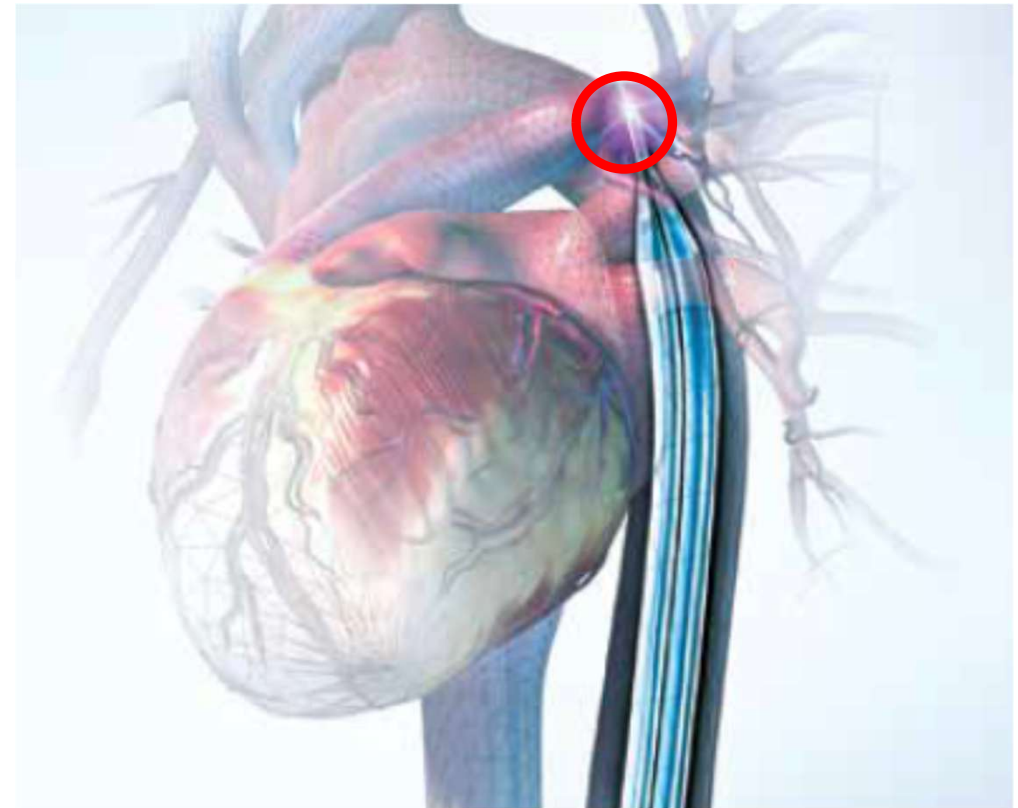
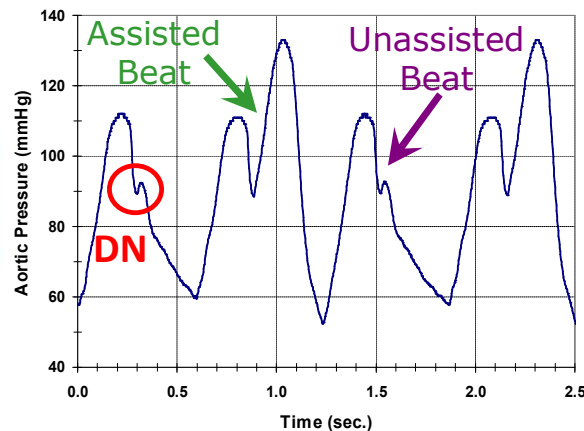
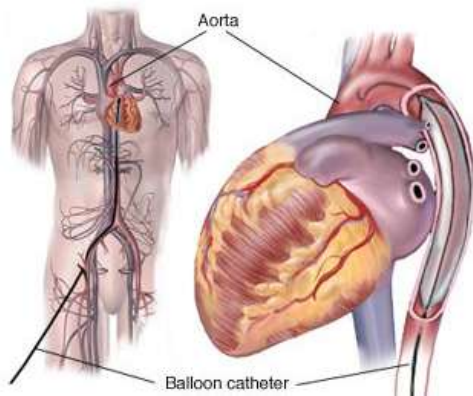
Small
Size



Case #1 Intra-Aortic Balloon Pumping (IABP)

Sensation[®] 7Fr IAB Catheter from *Getinge*

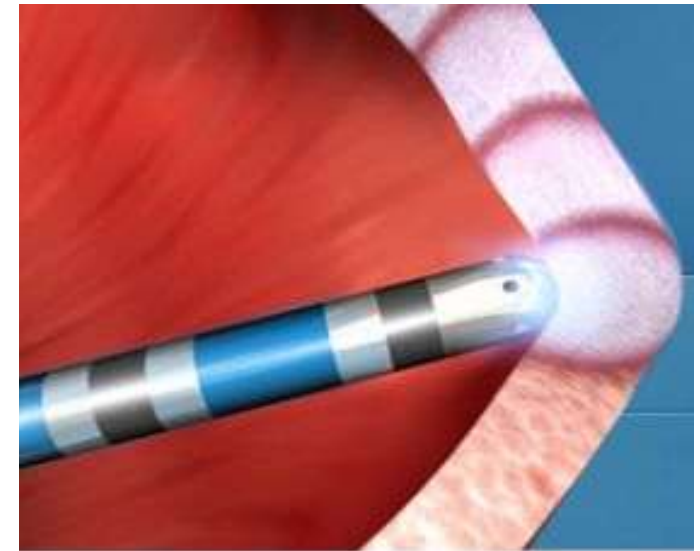
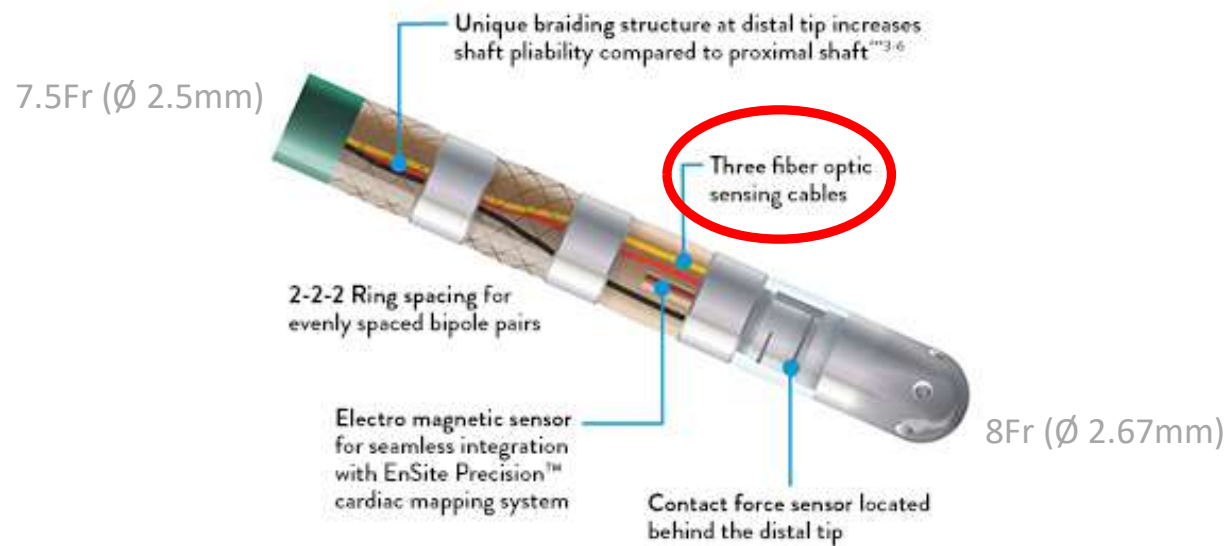
- Counter pulsation balloon pumping therapy
- **Optical sensor** provides *in situ* **crisp arterial P waveform** not affected by electrosurgical interference
- Compared to fluid-filled column:
 - Reduced signal transfer delay
 - Maximum lumen for He gas shuttle
 - Not affected by patient movement and positioning



Source https://www.getinge.com/siteassets/products-a-z/sensation-iab-catheter/ca_sensation_features-and-benefits_0868-rev-b_eng.pdf



Case #2 Force Sensing (*TactiCath*® from Abbot)



- Contact force ablation catheter
- To treat cardiac **arrhythmias** with **RF ablation**
- Light interferometry technology sensors provide **force intensity & orientation**
- Highly accurate (0,3 g)

Source

<https://www.cardiovascular.abbott/us/en/hcp/products/electrophysiology/ablation-technology/tacticath-se-ablation-catheter/about.html>

Case #3 FFR Diagnostic Devices with Optical P Sensors

Navvus[®] II from ACIST



COMET[™] II from *Boston Scientific*



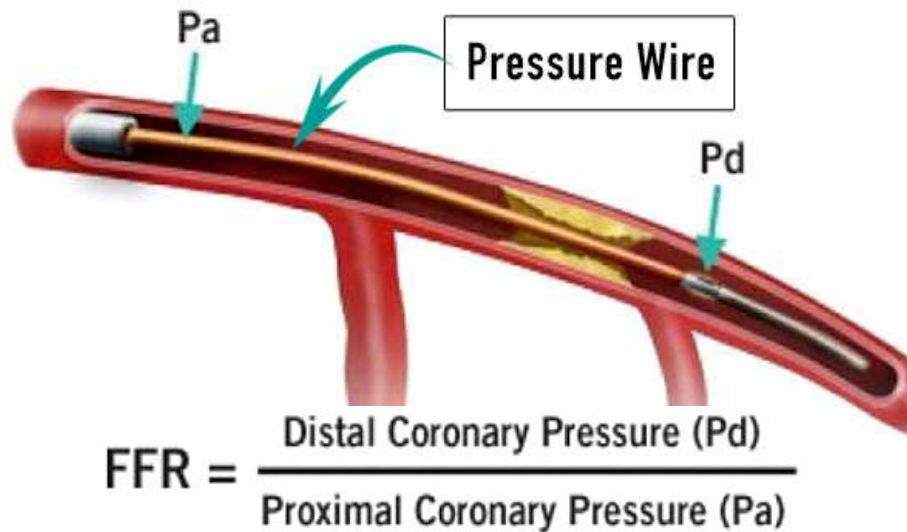
- Rapid Exchange FFR *MicroCatheter*
- Suitable for 0,014" guidewire (Ø <356µm)
- “Consistent & Accurate; **Fiber-optic sensor** technology may be *less susceptible to drift* when compared to traditional pressure wires”.

Source <https://acist.com/int/products/acist-rxi/navvusii-catheter/>

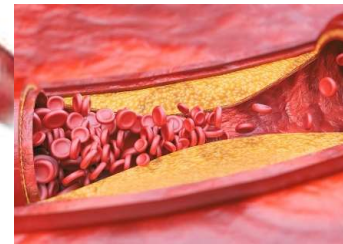
- Workhorse pressure GW with exceptional deliverability
- Accuracy for optimal performances to diagnose & treat
- “**Optical technology** for *superior drift performance* and reliable signal connection”

Source <https://www.bostonscientific.com/en-EU/products/imaging-systems/comet-II-pressure-guidewire.html>

Fractional Flow Reserve (FFR)



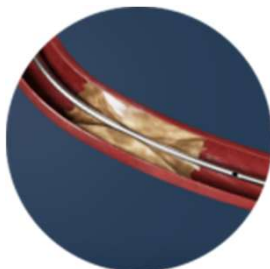
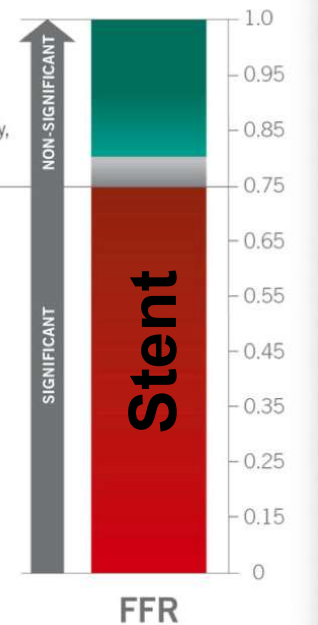
(During Maximum Hyperemia)



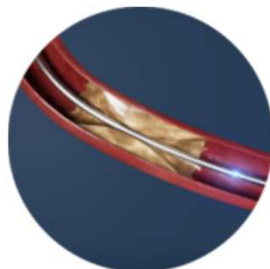
$FFR = 1.0$
Normal Artery

$FFR > 0.75$
Ischemia very unlikely,
sensitivity 88%

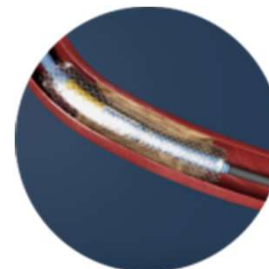
$FFR < 0.75$
Ischemia
specificity 100%



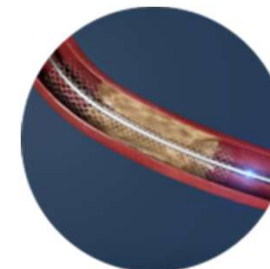
Cross



Diagnose



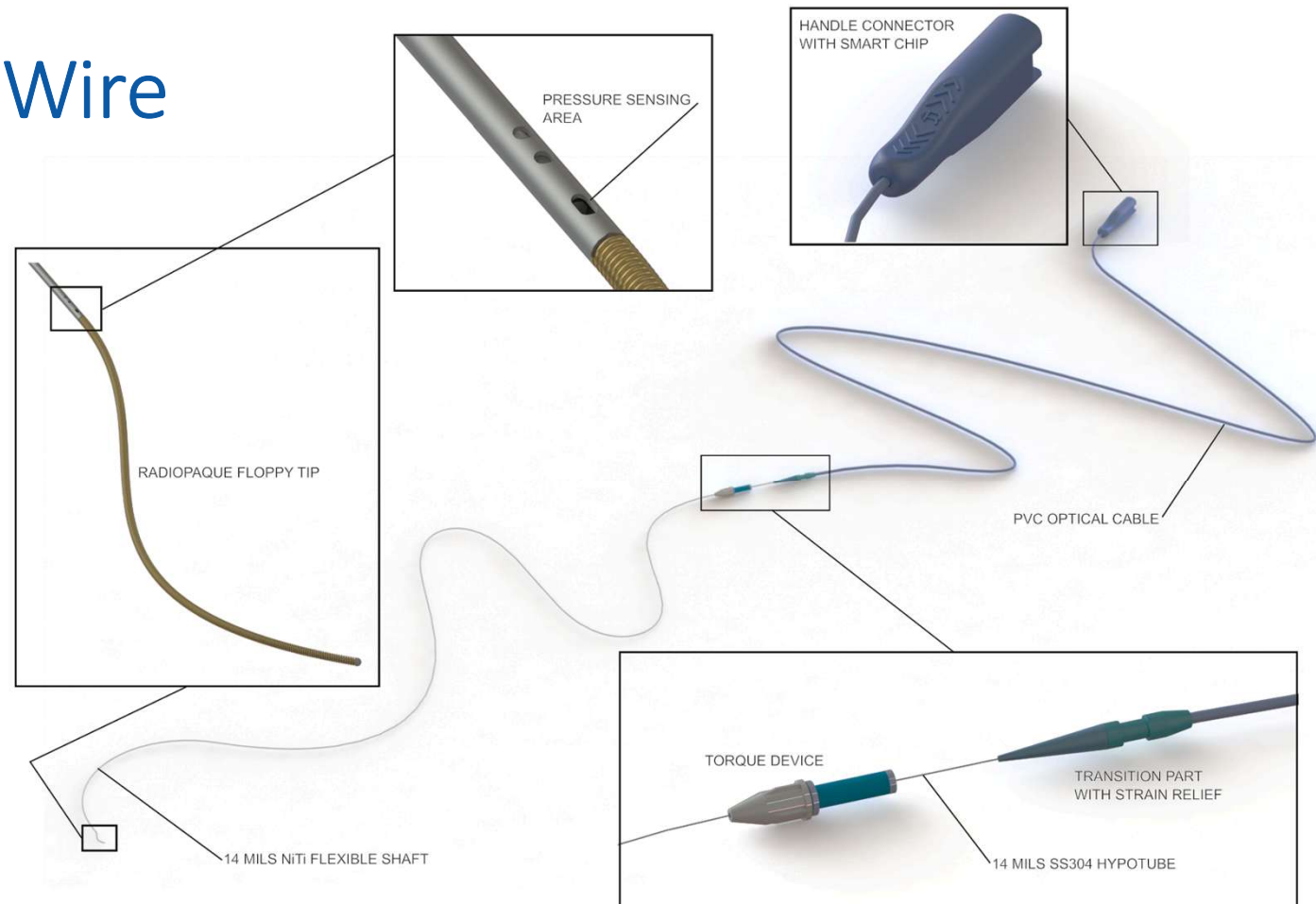
Treat



Validate

Our New Pressure Wire

- Ready-to-use 0.014" pressure wire
- Development platform for next generation of interventional devices
- Fast prototyping suitable for R&D tests and animal testing

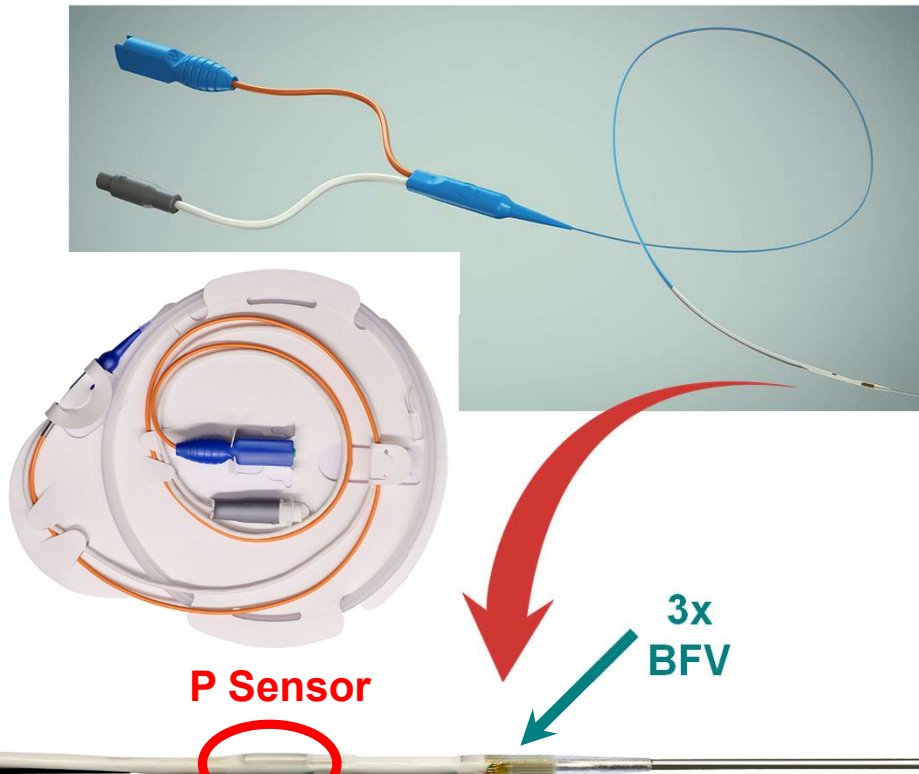


Case #4 *PyCath*® from *Medyria* (P & Flow RX Catheter)



- Rapid exchange (RX) catheter suitable for 0.014" GW ($\text{Ø}356\mu\text{m}$)
- Instrumented with F-P pressure sensor and 3 electrical BFV sensors
- Real-time physiological parameters (CFR, FFR, HMR...)

→ Assessing of coronary physiology



GW = Guide Wire
BFV = Blood Flow Velocity
CFR = Coronary Flow Reserve
FFR = Fractional Flow Reserve
HMR = Hyperemic Microvascular Resistance



Source: <https://www.medyria.com/pycath>



What's Next?

- Multi-parameter sensing
(Pressure, Flow, Temperature, Force...)
- Always smaller
interventional devices
- Real-time physiological
guidance
- AI-assisted interpretation
- MRI-compatible robotic
intervention



Image generated by ChatGPT



Key Takeaways



Fiber optics are no longer only light guides



Optical sensing enable better clinical decisions



Miniaturization is driving new medical procedures

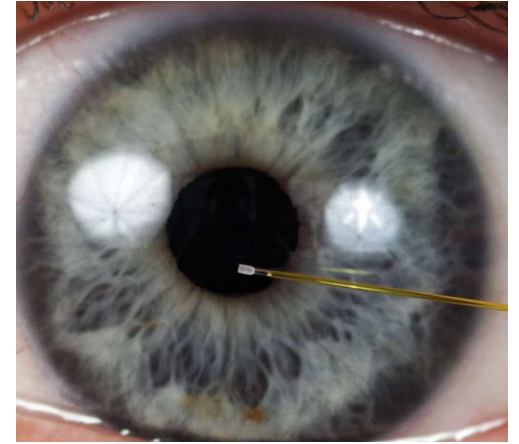


The future lies in smarter interventional devices



Questions & Answers

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