FFR: pitfalls

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Pitfalls can be related to....

**Preparation**
- Calibration
- Equalization

**Measurement**
- Drifting
- Hyperaemia
- Wedging
- Whipping

**Tracing interpretation**
- Cursor position
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Calibration
‘teaching’ the system, what is zero pressure
Setting in the cathlab
**Calibration: Position of the Transducer**

- Aortic pressure is measured by the **fluid filled guiding catheter**
- Its value is a **relative pressure**, compared to the reference, measured at the transducer
- **Height of the transducer** has a measurable impact on the value
Calibration: Position of the Transducer

Pressure TOO LOW
Pressure OK
Pressure TOO HIGH
Calibration: PressureWire
Calibration: PressureWire

• Fill the tube of the wire with saline
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Calibration: PressureWire

• Fill the tube of the wire with saline

• Wait a minute to have the system stabilized

• Perform calibration afterwards
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Equalization
‘teaching’ the two systems, to speak the same language
Equalization

\[ P_a = P_d \]
After equalization

DO NOT CHANGE YOUR SETTING
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Drifting
When the two systems forget to speak the same language ...
Post-measurement check

Drift!!!
Drift vs Gradient ??

**True Gradient**
- Different morphology
- Dicrotic notch not visible

**Drift**
- Same morphology
- Parallell shifting
- Dicrotic notch well visible

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Hyperaemia
No hyperaemia ...?
... no FFR!
Wedging
Aortic pressure is inaccurately measured...
Size of the guiding catheter

Induced area stenosis

6F

7F

8F
Size of the guiding catheter

Induced area stenosis

6F

7F

8F
Wedging guiding catheter
Disengaged guiding catheter
Wedging guiding catheter

FALSE 0.88

TRUE FFR 0.66

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Functional wedging of guiding catheter

Slight reduction in hyperemic Pd/Pa at disengangement that with values close to the threshold resulted into transition of 0.80 in 30% of the cases
Whipping
Whipping

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Tracing interpretation
- Cursor position
Position the cursor to the lowest value where indeed FFR was measured.
Position the cursor to the lowest value where indeed FFR was measured.
Fractional flow reserve measurement

Obtain accurate measurements

Induce proper maximal hyperaemia

Reading the pressure tracings appropriately
Thank you for your attention!

Credit for the slides to Dr. Gabor Toth and Nico Pijls

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Fractional flow reserve measurement

Maximal hyperaemia

Accurate distal coronary pressure ($P_d$)

Accurate aortic pressure ($P_a$)

FFR
Drift vs Gradient ??

- Curves are identical in shape
- Curves are shifted parallel
- Dicrotic notch is well visible on both
Importance of Maximal Vasodilation

**Epicardial**
- Conductance
- Arteries > 550 μ

**Microvasculature**
- Resistance
- Arteries < 550 μ

**Nitrates**
- Vasospasm

**Adenosine**
- Autoregulation

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- Insufficient hyperaemia
  - Underestimation of the gradient
    - Overestimation of the FFR
      - Underestimation of disease
Calibration: Position of the Transducer

- **Pressure TOO LOW**
- **Pressure OK**
- **Pressure TOO HIGH**

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Setting in the cathlab