Genova, 14 aprile 2023

Come usare la fisiologia per guidare l'impianto e l'ottimizzazione dello stent?

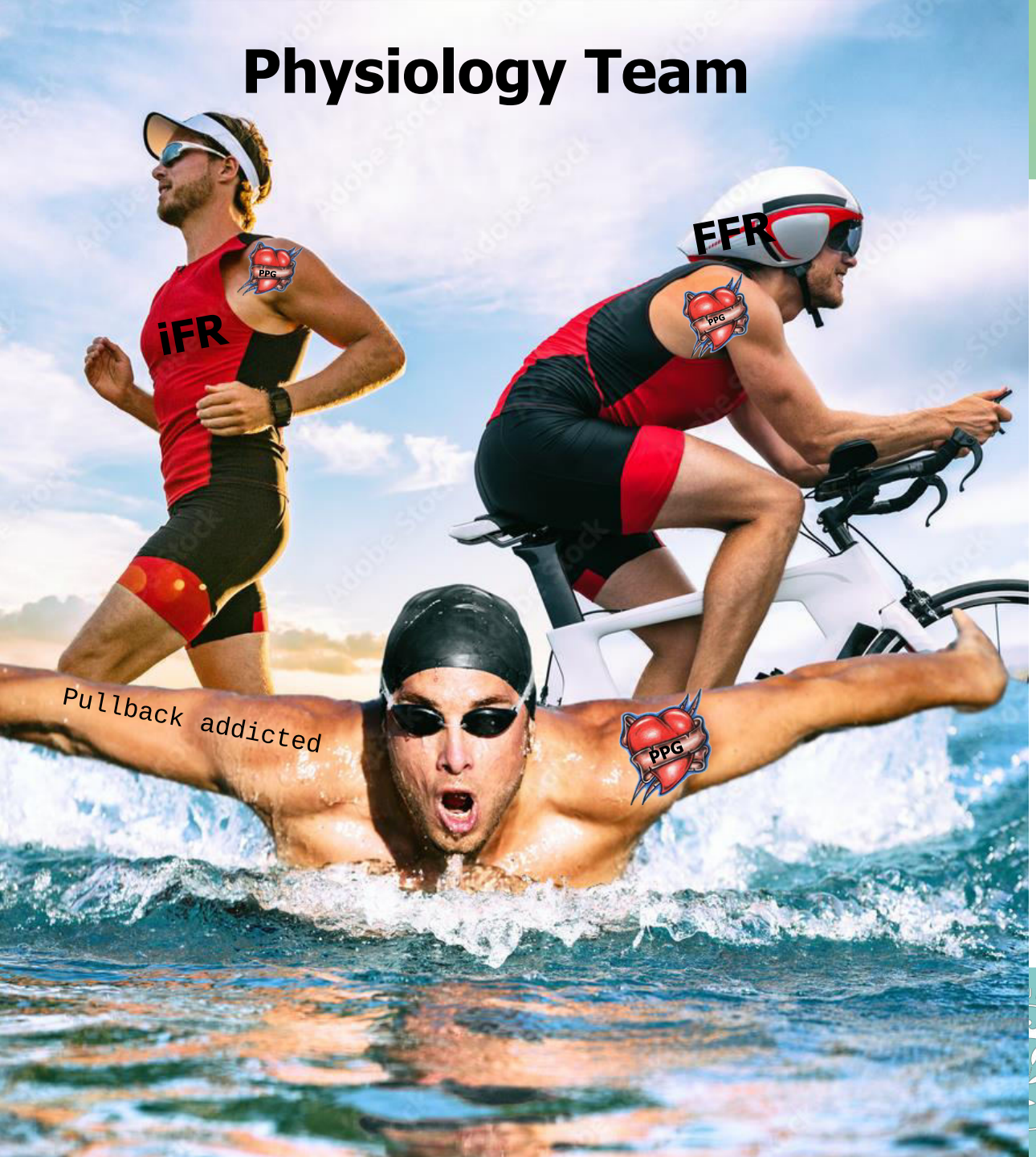
Simone Biscaglia, Ferrara University Hospital, Italy

Pullback interpretation

FFR post PCI

$$\textbf{PPG} = \frac{\dfrac{\text{Maximal Pressure Gradient over 20\% pullback duration}}{\text{Vessel FFR gradient}} + (1 - \text{proportion of pullback time with FFR deterioration})}{2}$$

Physiology Team



Intermountain® Healthcare

IRONMAN® 70.3® WORLD CHAMPIONSHIP

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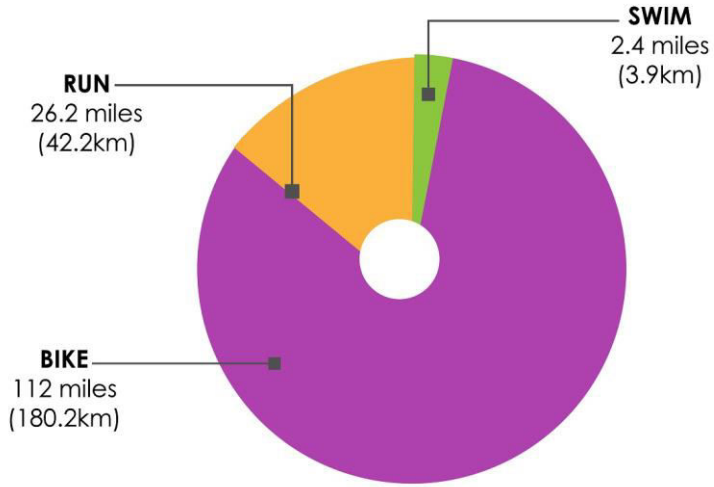
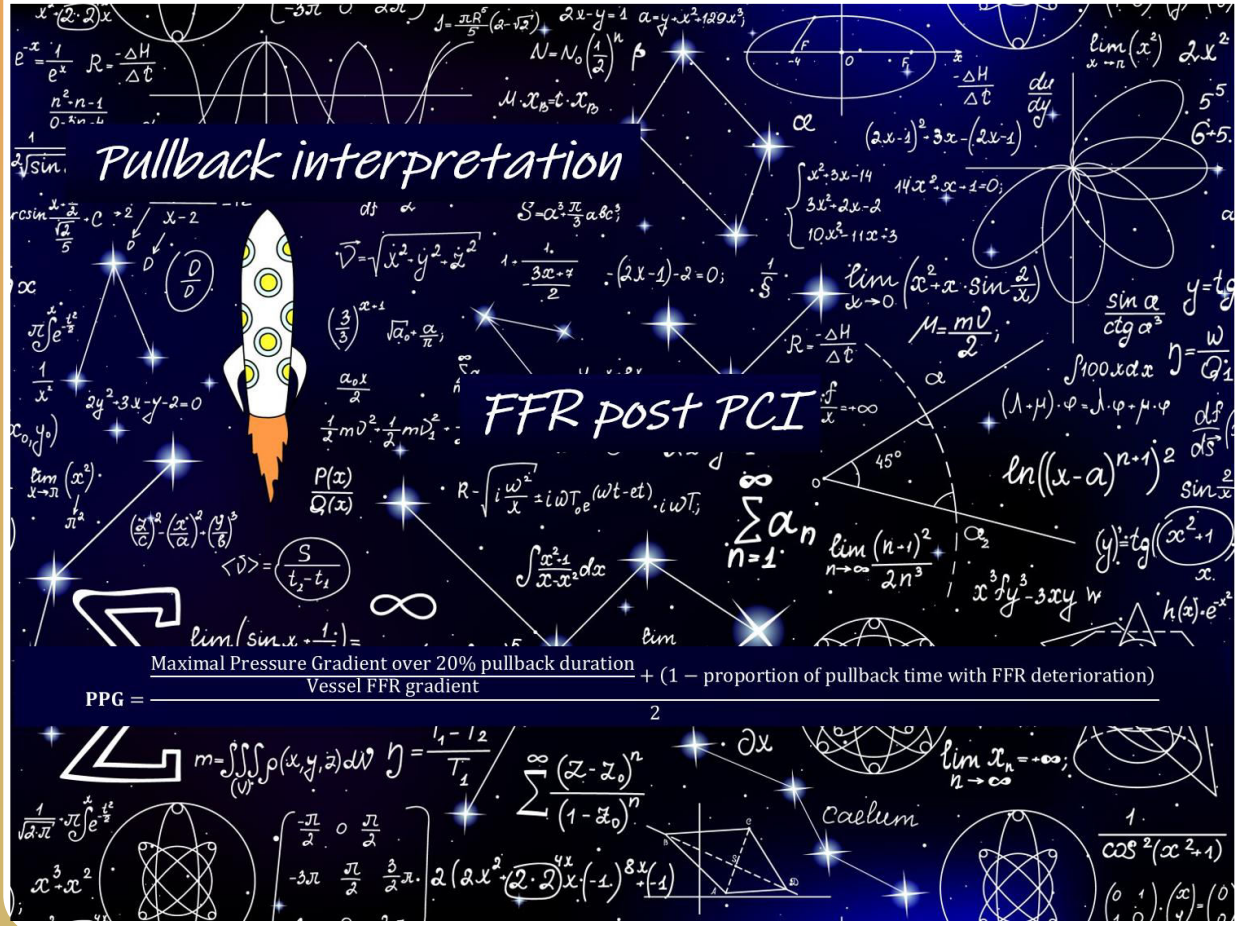
St. George Utah | USA

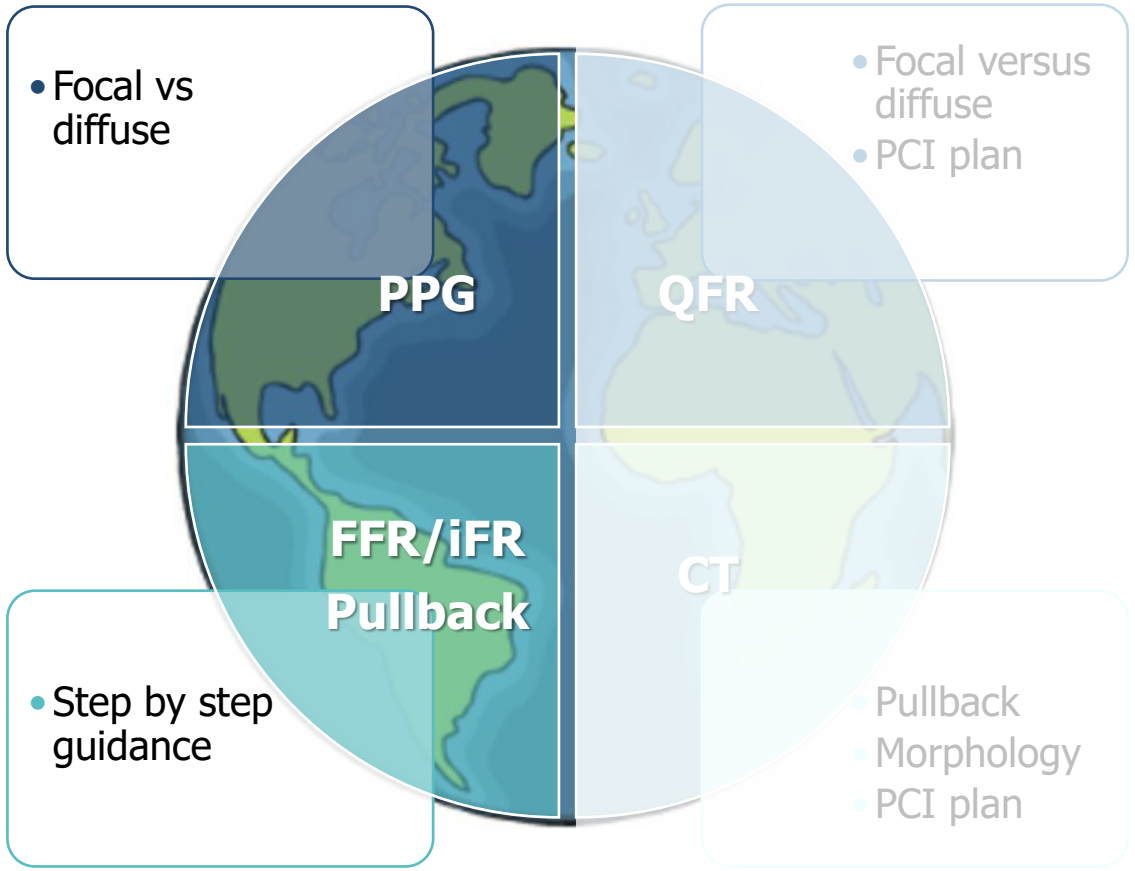
Full-Ironman Distances



& THEN PHYSIO-GUIDED PCI

The full physiology world



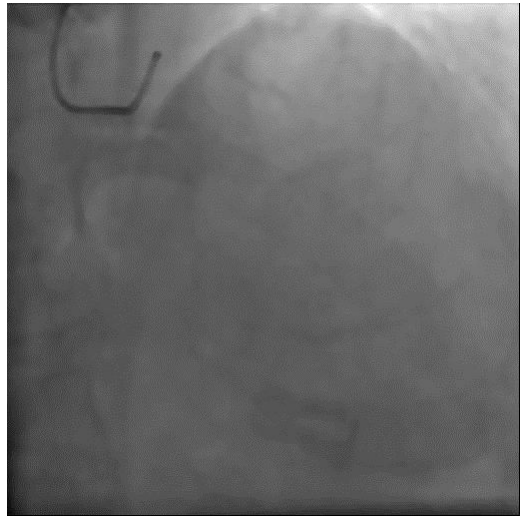


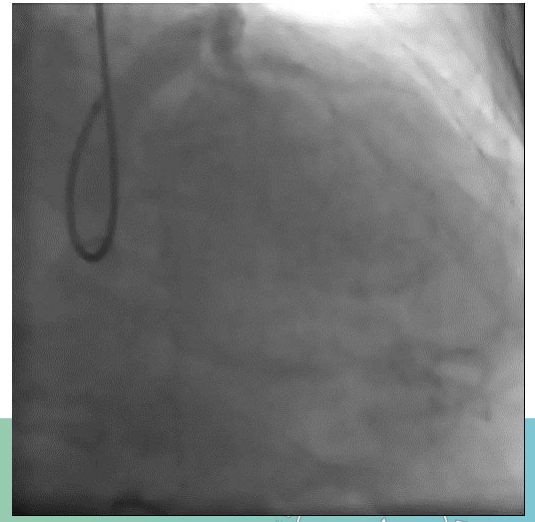
PPG

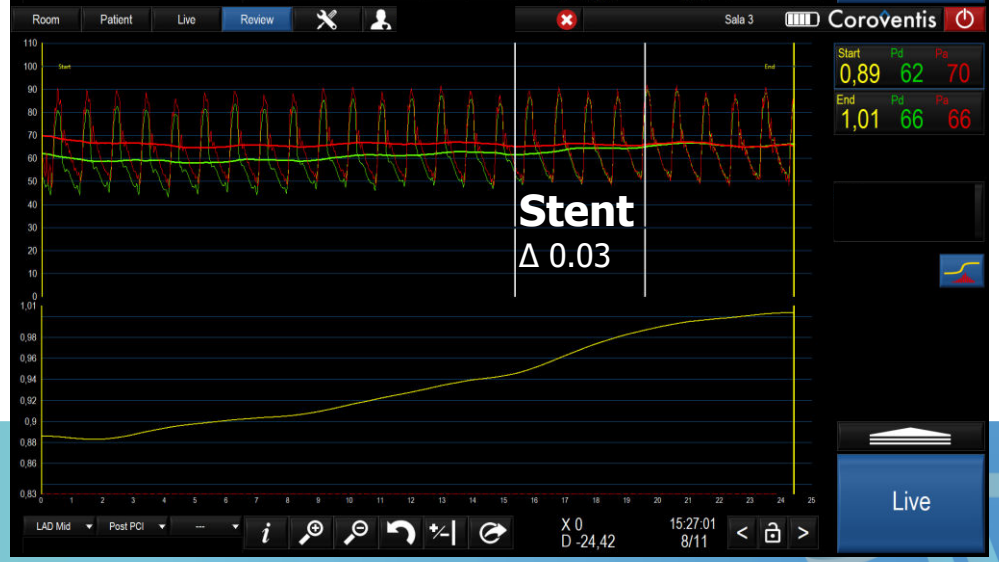
Focal

Vs

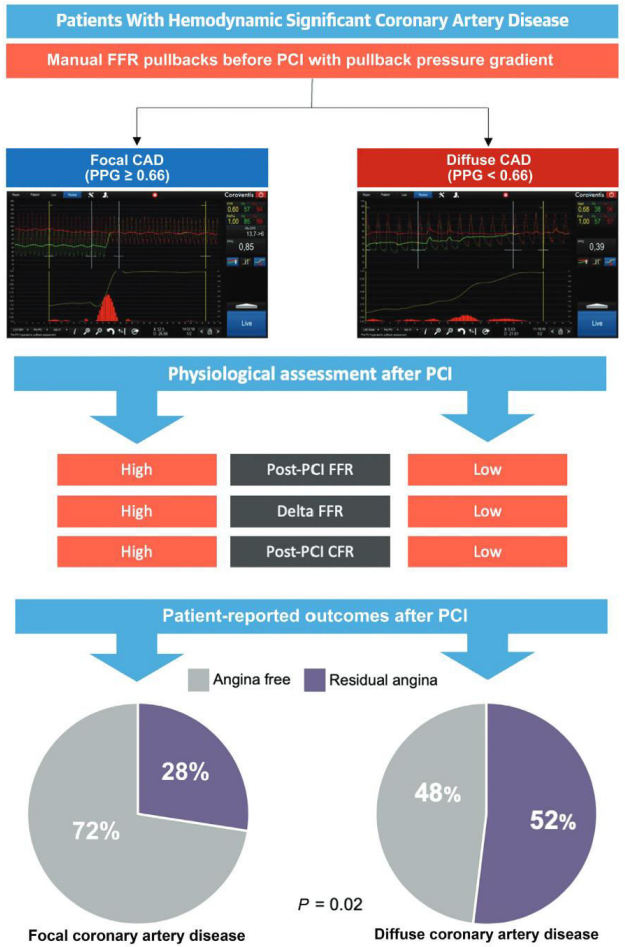
Diffuse

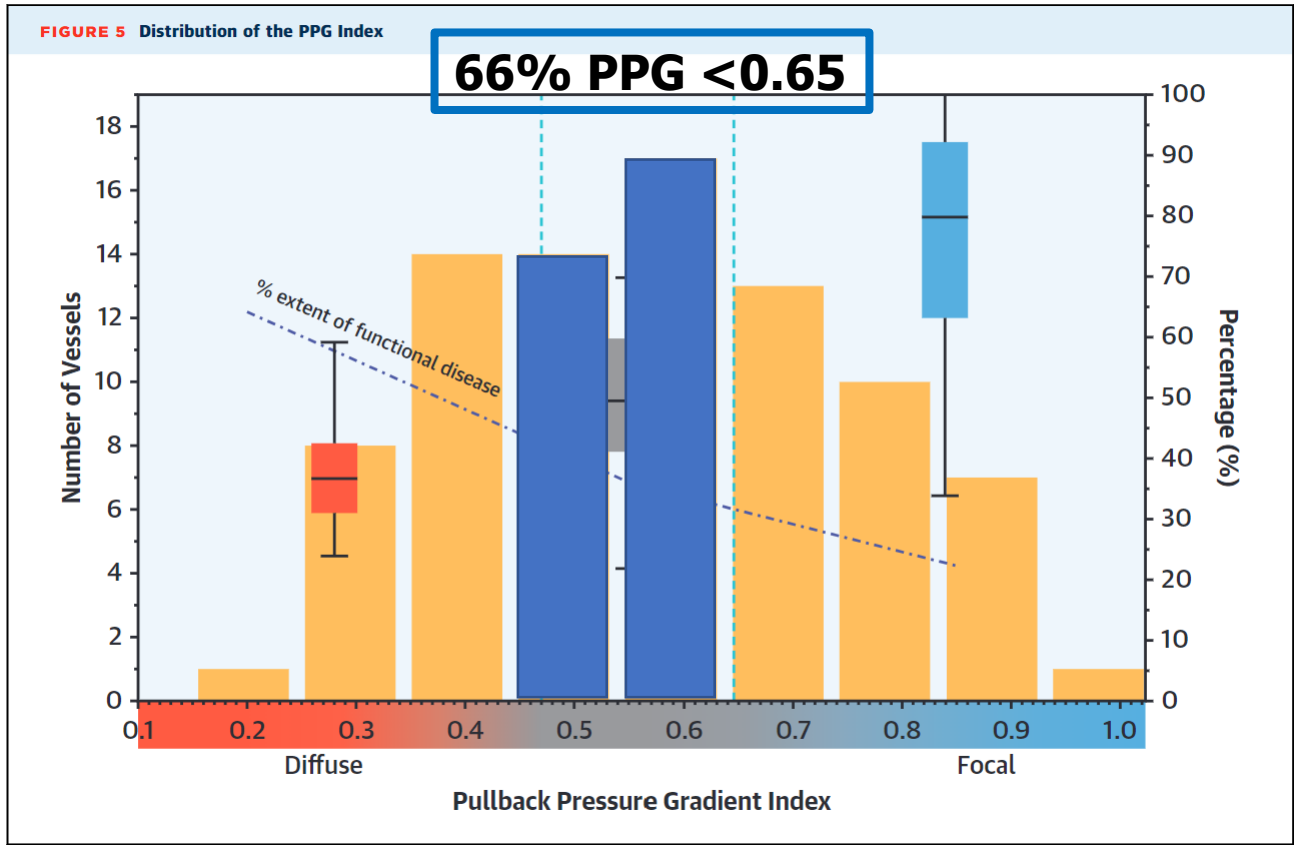






PPG



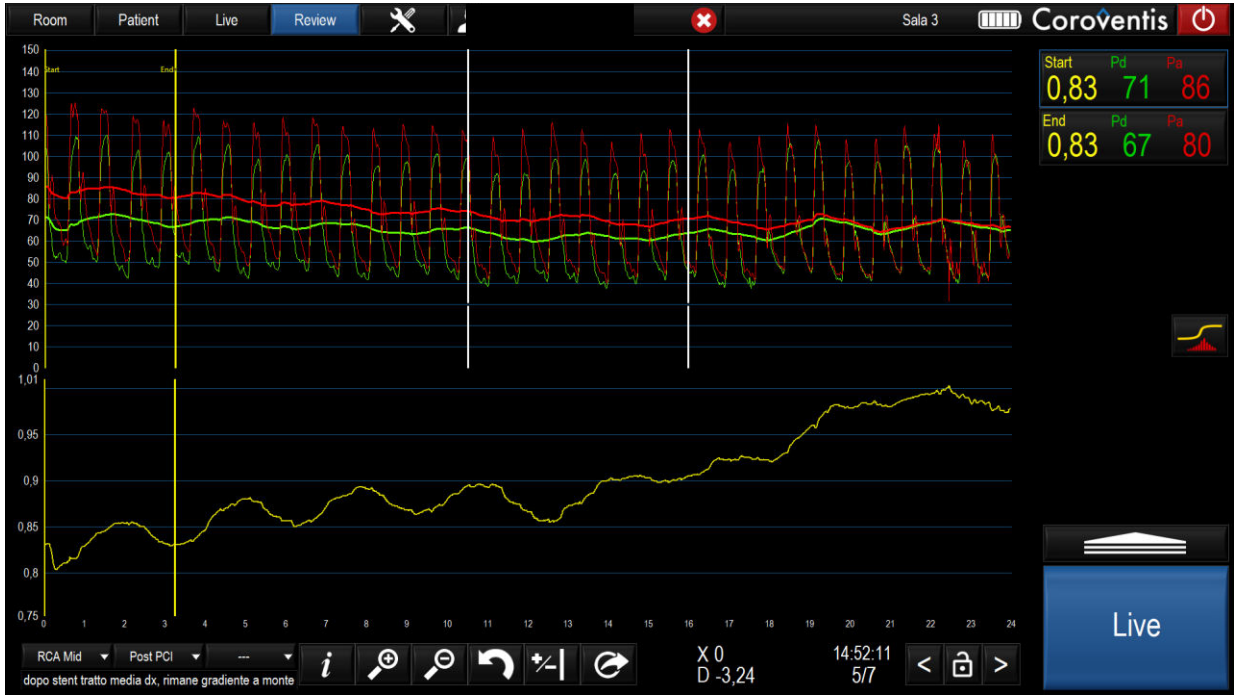


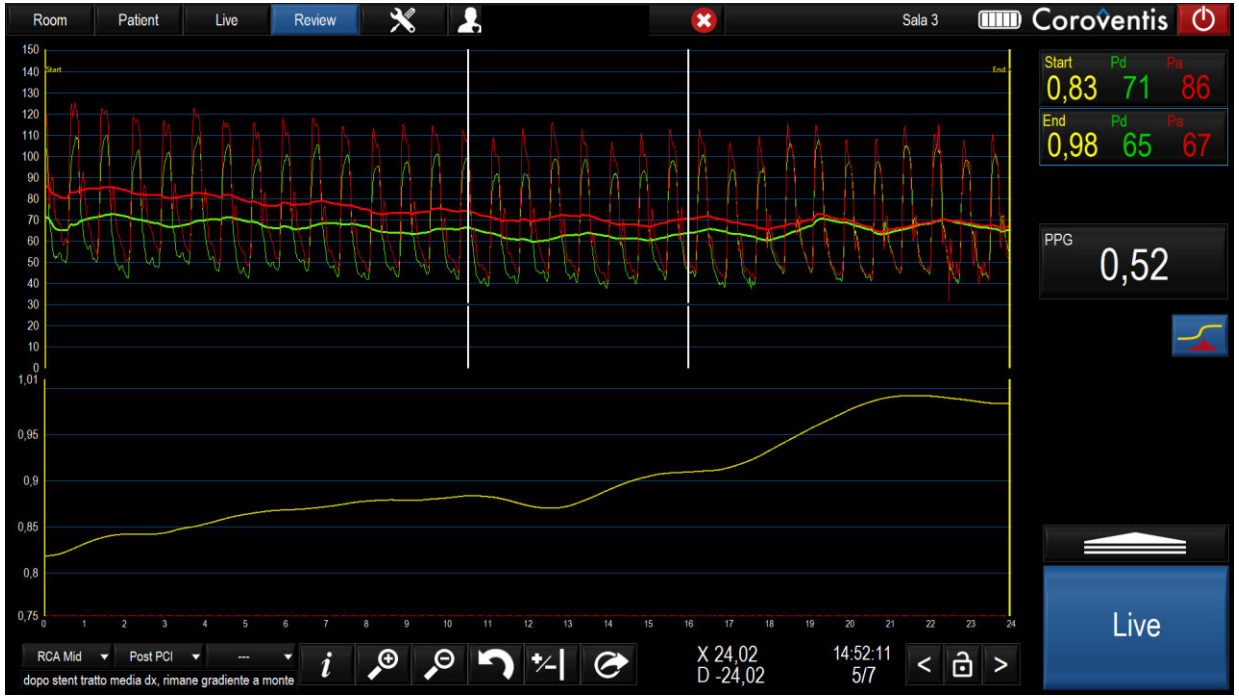
Collet C, JACC CVI 2022

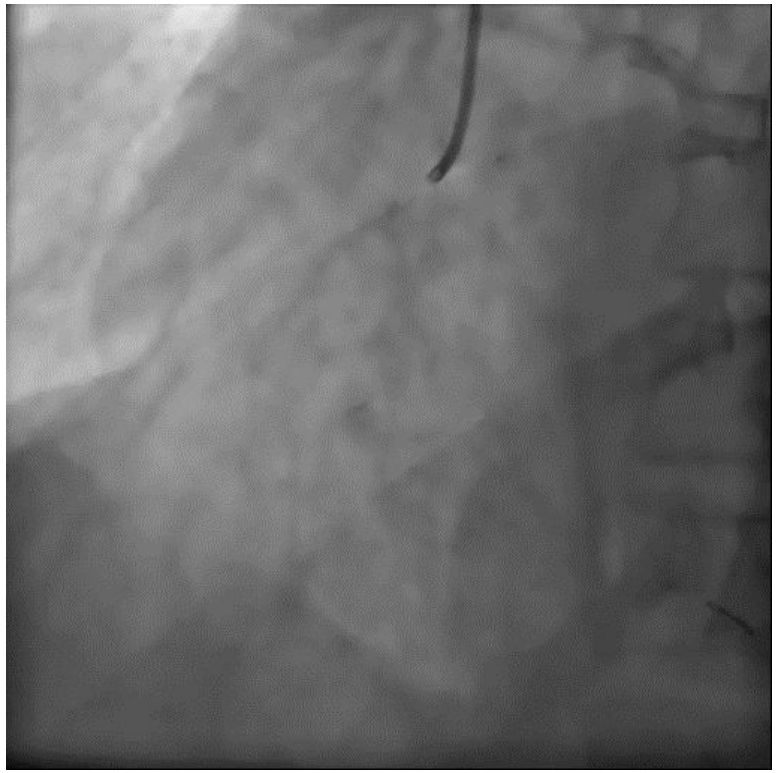
Collet C, JACC 2019

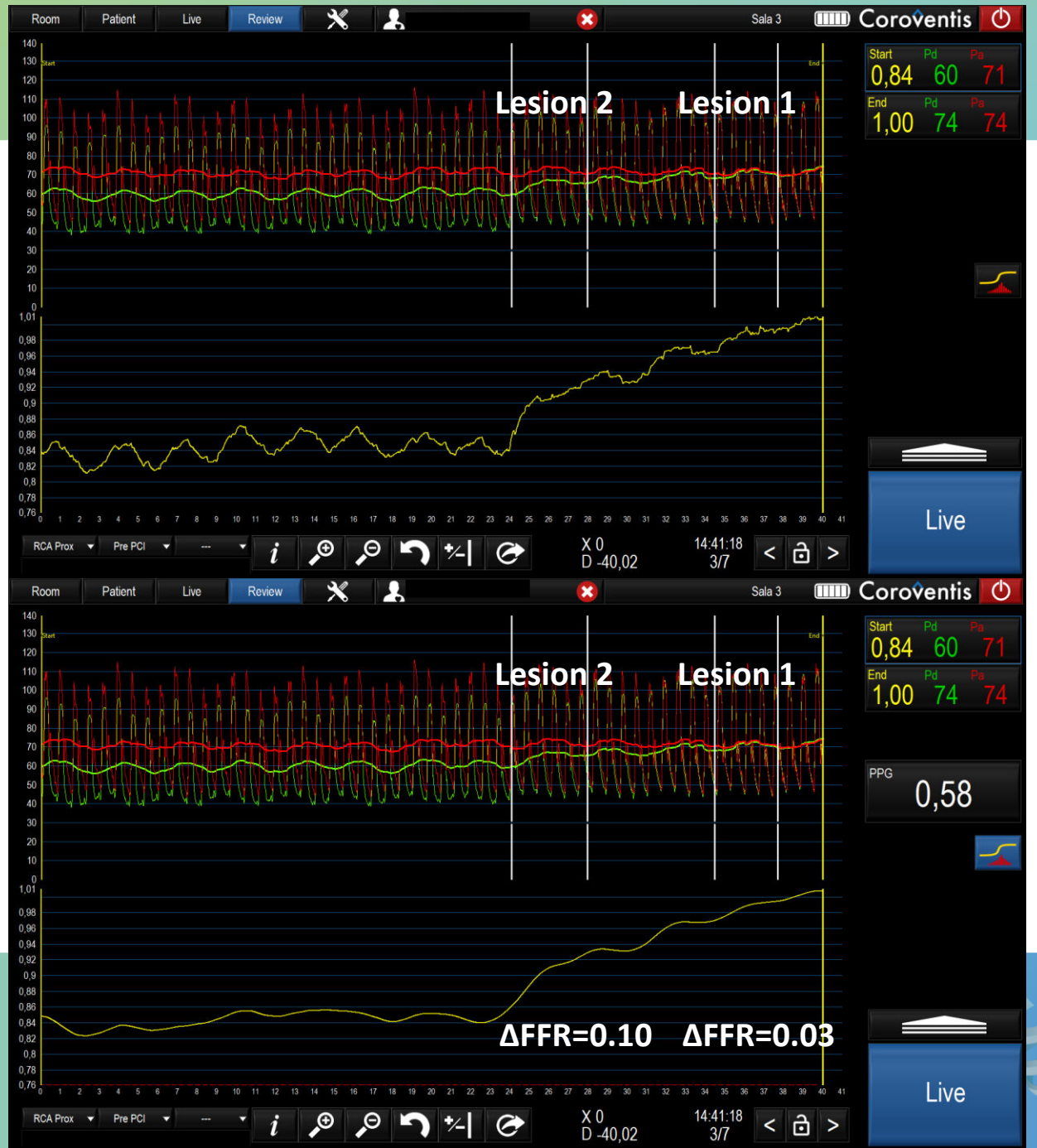
Real PPG advantage...

Pullback trace improvement





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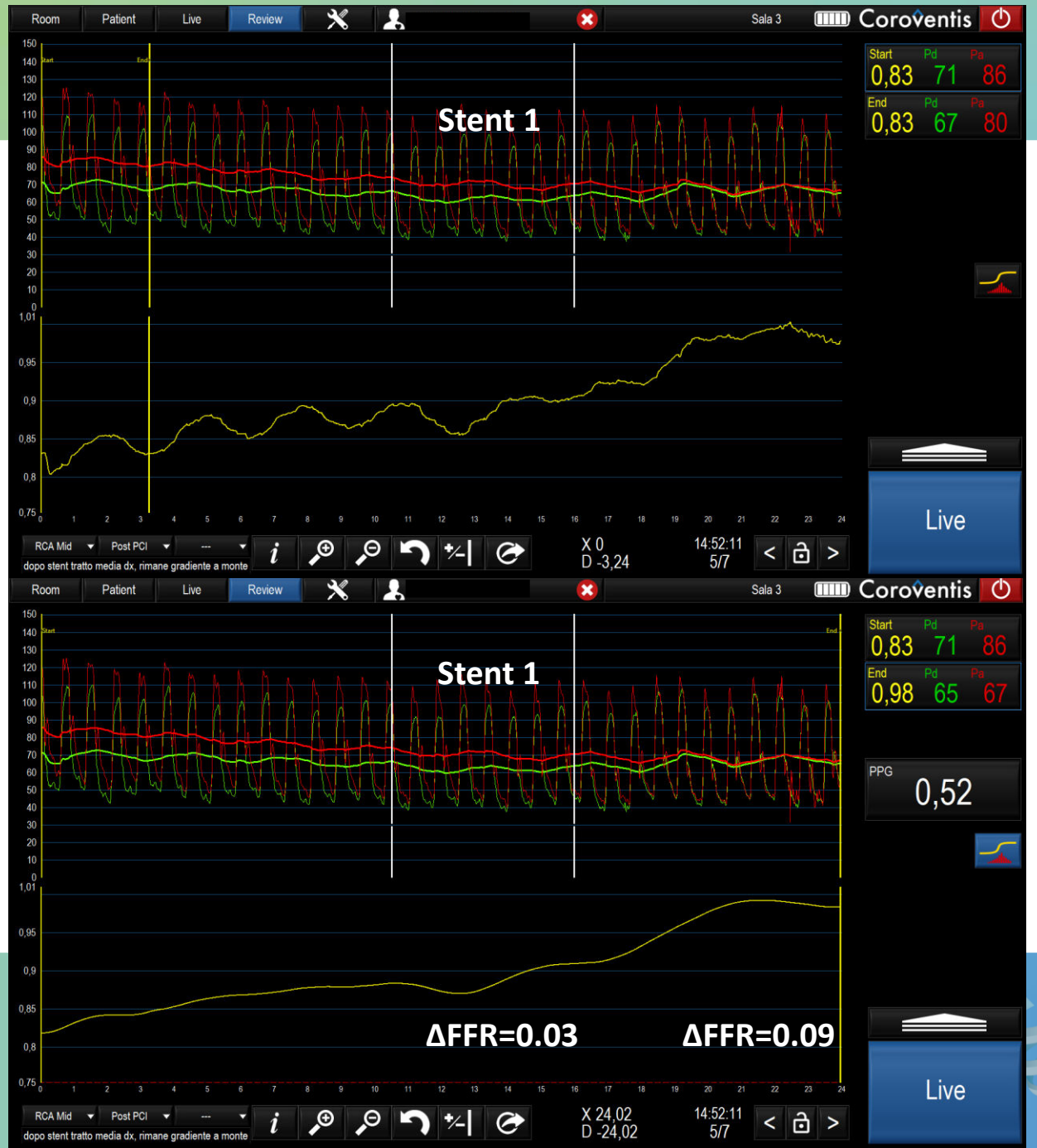
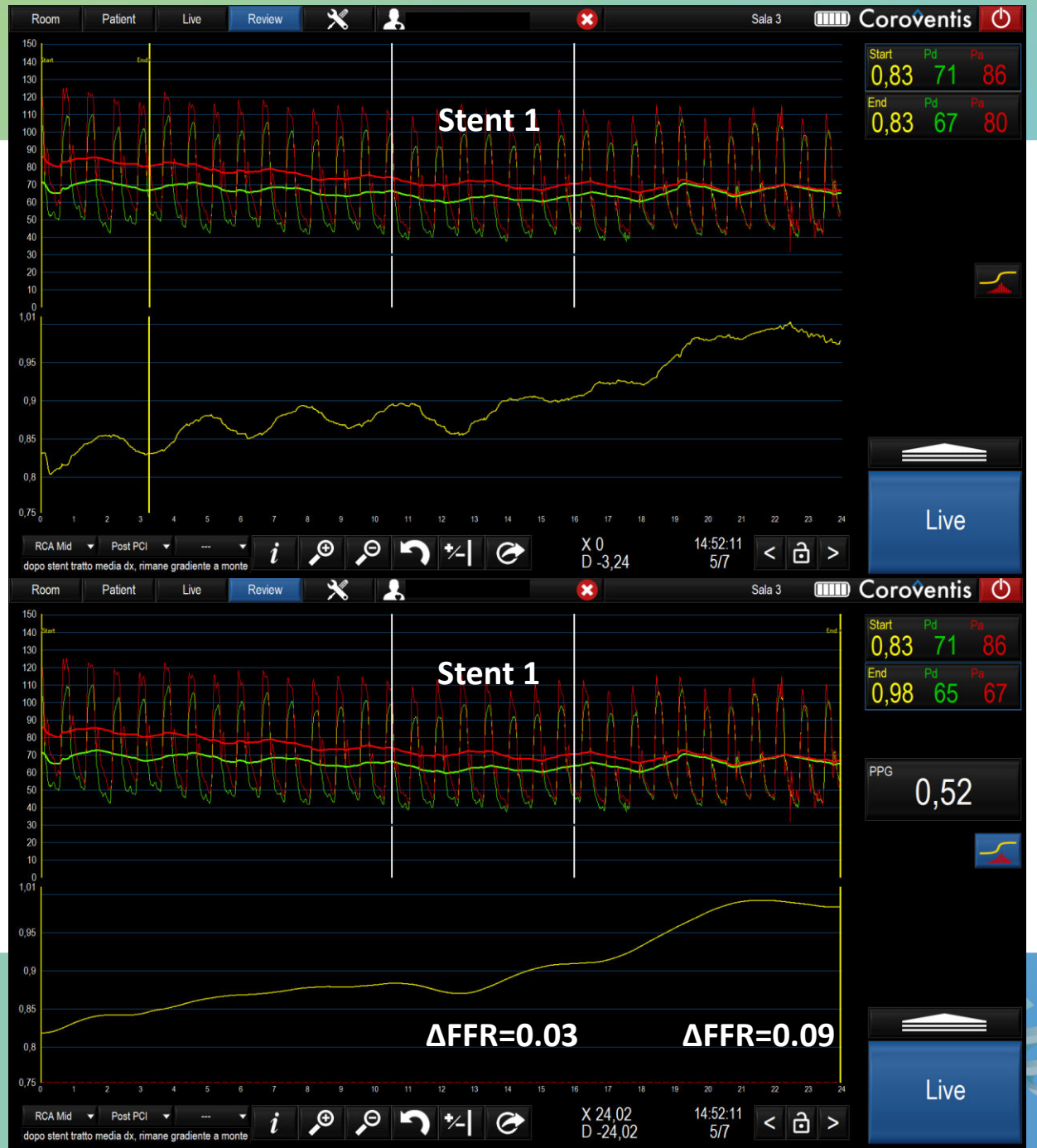
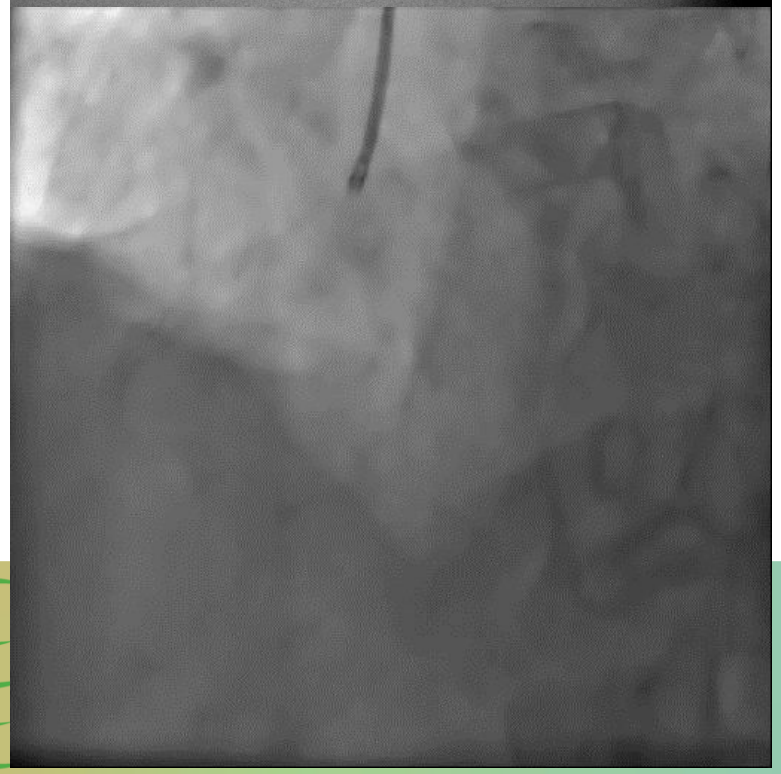
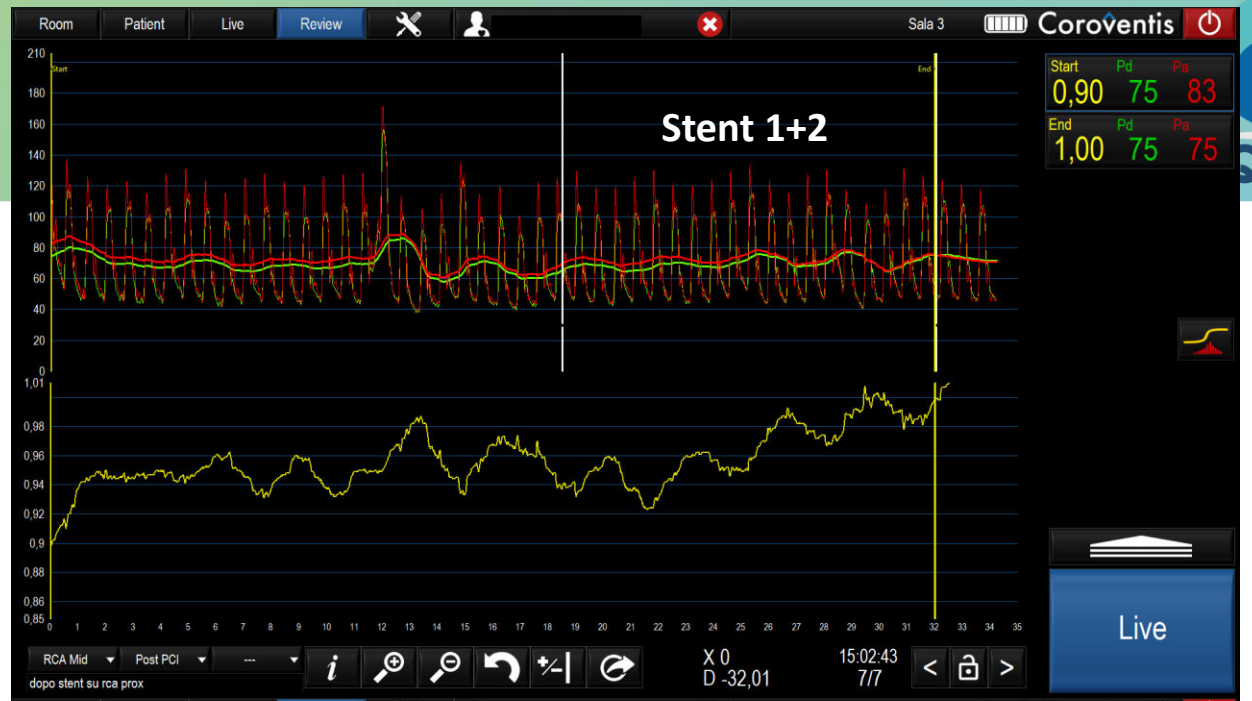
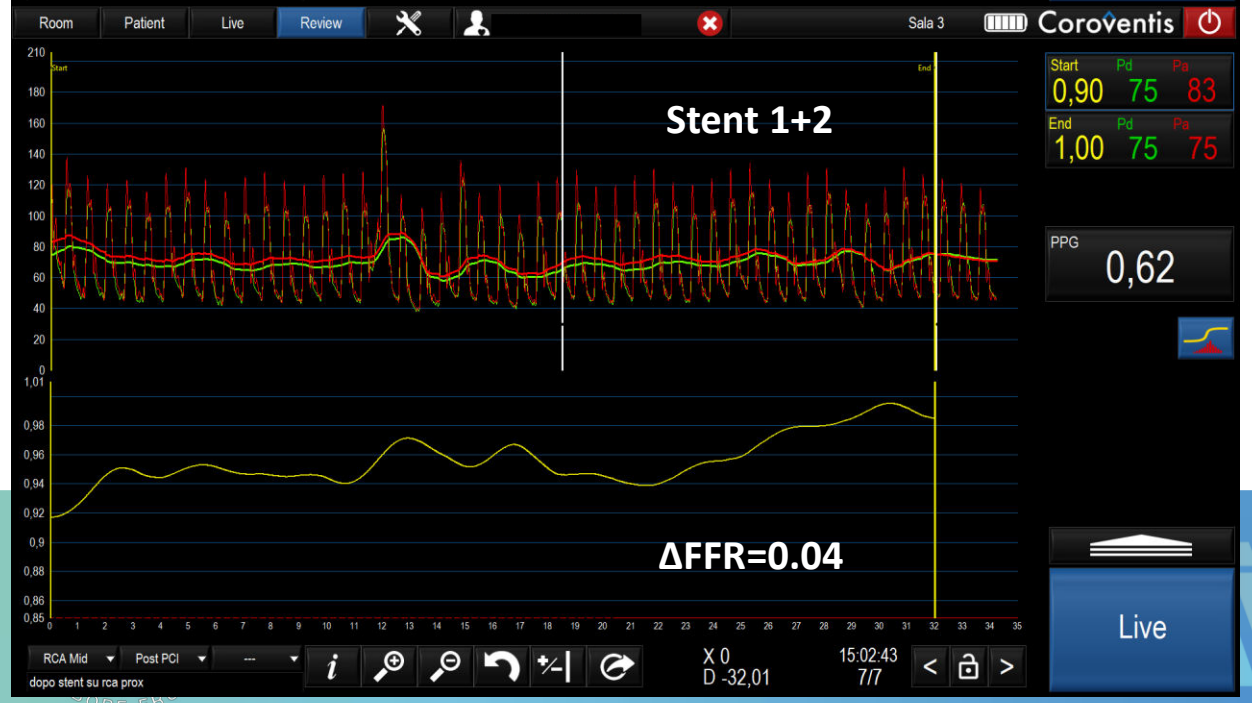
Patient
Live
Review
Sala 3
Coroventis
Start Pd Pa
0,84 60 71
End Pd Pa
1,00 74 74
Lesion 2
Lesion 1
RCA Prox
Pre PCI
X 0
D -40,02
14:41:18
3/7
Live
Room
Patient
Live
Review
Sala 3
Coroventis
Start Pd Pa
0,84 60 71
End Pd Pa
1,00 74 74
PPG
0,58
Lesion 2
Lesion 1
ΔFFR=0.10
ΔFFR=0.03
RCA Prox
Pre PCI
X 0
D -40,02
14:41:18
3/7
Live


Room
Patient
Live
Review
Sala 3
Coroventis
Stent 1
Start Pd Pa
0,83 71 86
End Pd Pa
0,83 67 80
Live
RCA Mid
Post PCI
dopo stent tratto media dx, rimane gradiente a monte
X 0
D -3,24
14:52:11
5/7
Room
Patient
Live
Review
Sala 3
Coroventis
Stent 1
Start Pd Pa
0,83 71 86
End Pd Pa
0,98 65 67
PPG
0,52
ΔFFR=0.03
ΔFFR=0.09
Live
RCA Mid
Post PCI
dopo stent tratto media dx, rimane gradiente a monte
X 24,02
D -24,02
14:52:11
5/7


Room
Patient
Live
Review
Sala 3
Coroventis
Stent 1
Start Pd Pa
0,83 71 86
End Pd Pa
0,83 67 80
Live
RCA Mid
Post PCI
dopo stent tratto media dx, rimane gradiente a monte
X 0
D -3,24
14:52:11
5/7
Room
Patient
Live
Review
Sala 3
Coroventis
Stent 1
Start Pd Pa
0,83 71 86
End Pd Pa
0,98 65 67
PPG
0,52
ΔFFR=0.03
ΔFFR=0.09
Live
RCA Mid
Post PCI
dopo stent tratto media dx, rimane gradiente a monte
X 24,02
D -24,02
14:52:11
5/7




Room
Patient
Live
Review
Sala 3
Coroventis
Start Pd Pa
0,90 75 83
End Pd Pa
1,00 75 75
Stent 1+2
RCA Mid
Post PCI
dopo stent su rca prox
X 0
D -32,01
15:02:43
7/7
Live


Room
Patient
Live
Review
Sala 3
Coroventis
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End Pd Pa
1,00 75 75
PPG
0,62
Stent 1+2
ΔFFR=0.04
RCA Mid
Post PCI
dopo stent su rca prox
X 0
D -32,01
15:02:43
7/7
Live

TSG

FIGURE 1

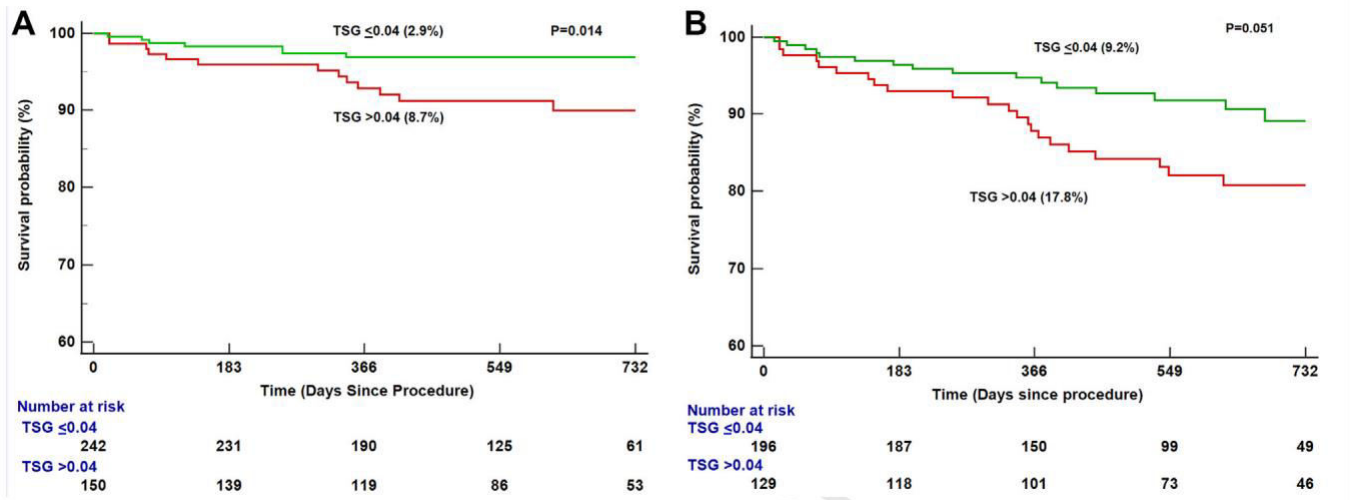


TABLE 7 Multivariate Analysis for Predictors of Target Vessel Failure

	HR[a]	95% CI	*P* Value	HR[b]	95% CI	*P* Value
Age	1.04	1.00-1.07	0.01	1.03	1.00-1.07	0.02
Prior MI	0.96	0.36-2.5	0.93	1.27	0.46-3.49	0.64
Prior PCI	1.33	0.52-3.42	0.56	1.17	0.44-3.13	0.76
Prior CABG	3.99	1.65-9.64	0.002	4.43	1.71-11.51	0.002
PAD	3.02	1.16-7.86	0.02	2.38	0.86-6.54	0.09
Diffuse disease	1.8	0.7-4.7	0.18	1.9	0.7-4.8	0.17
ACS	1.76	0.75-4.13	0.19	1.65	0.67-4.06	0.28
Post-PCI FFR < 0.86	3.03	1.11-8.23	0.03			
TSG < 0.04				0.35	0.14-0.89	0.03

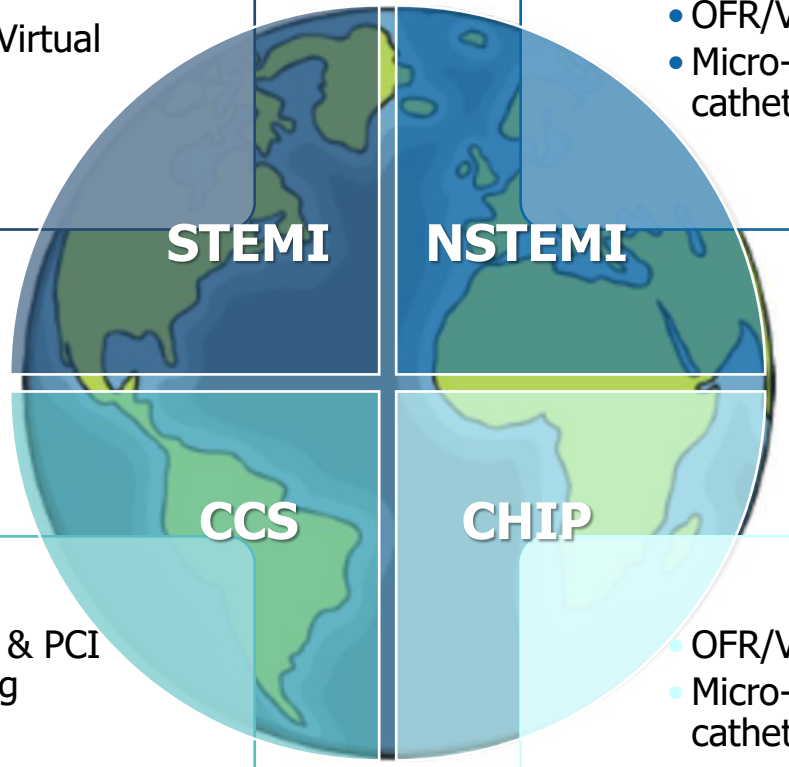
Marker inizio e fine stent!

Uretsky B, Biscaglia S, JACC CVI 2022

The full physiology world

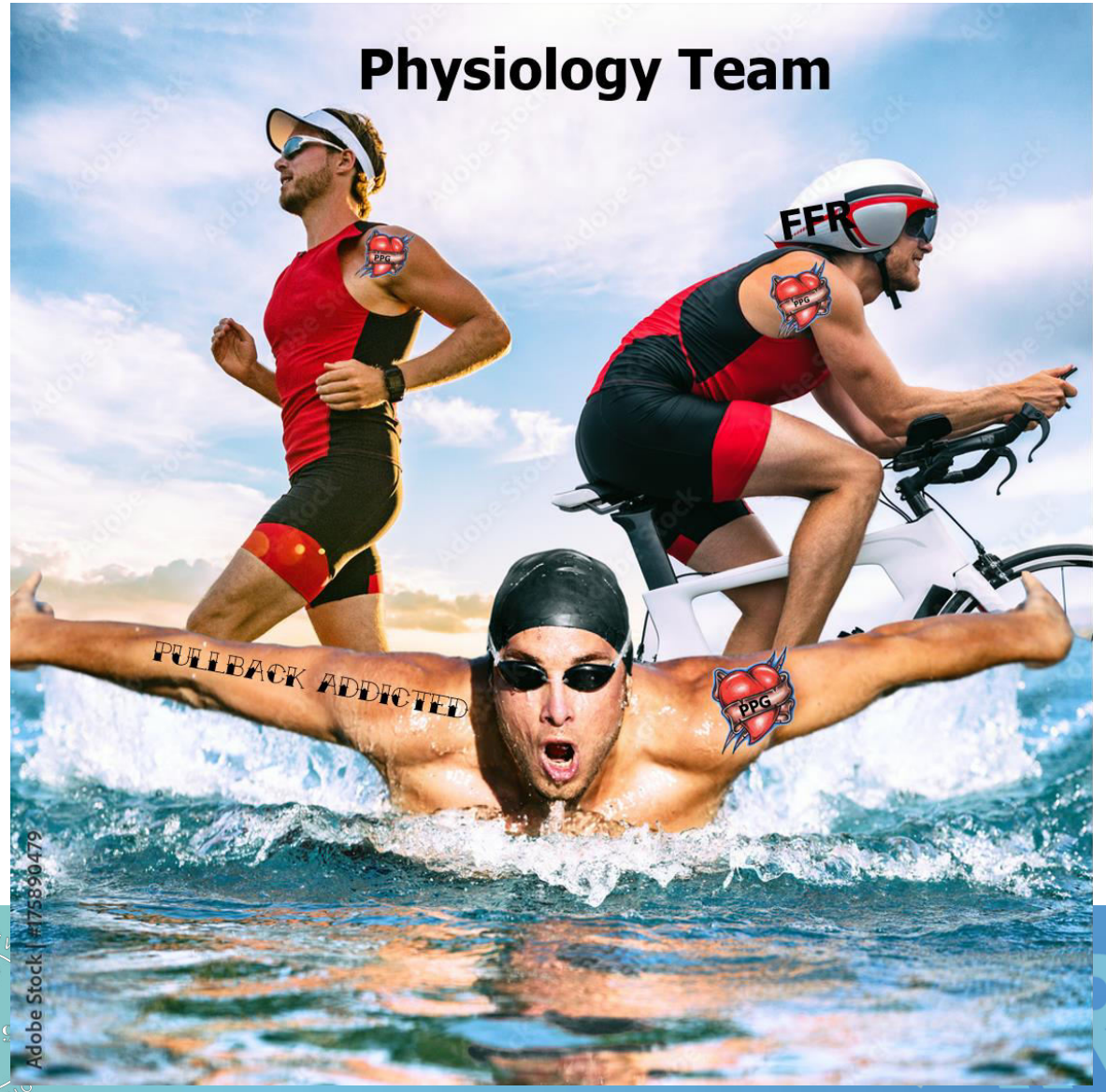
- QFR & Virtual PCI

- OFR/VFR
- Micro-catheter



- CT-FFR & PCI planning

- OFR/VFR/UFR
- Micro-catheter

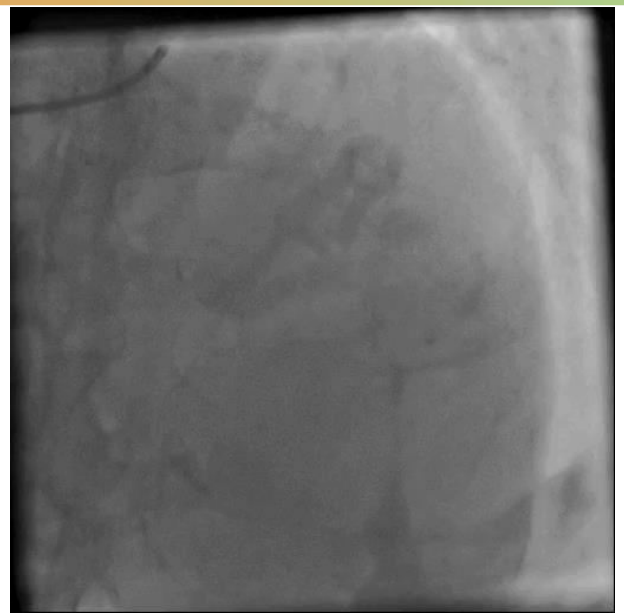


CHIP

Microcatheter is the way to go

- Bifurcations (non-LM &LM)
- Diffuse disease
- Ostial and serial lesions

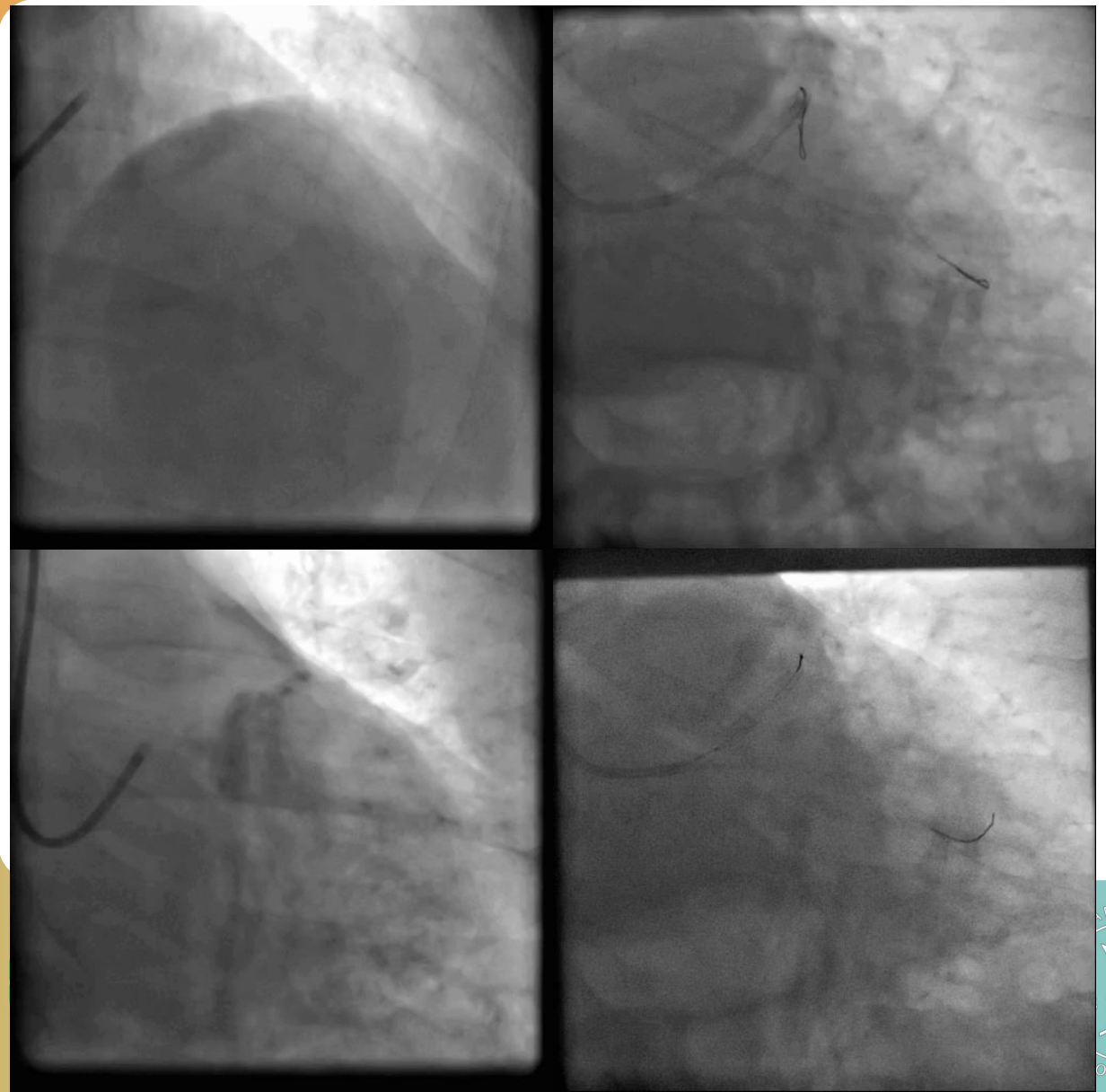
Bifurcation

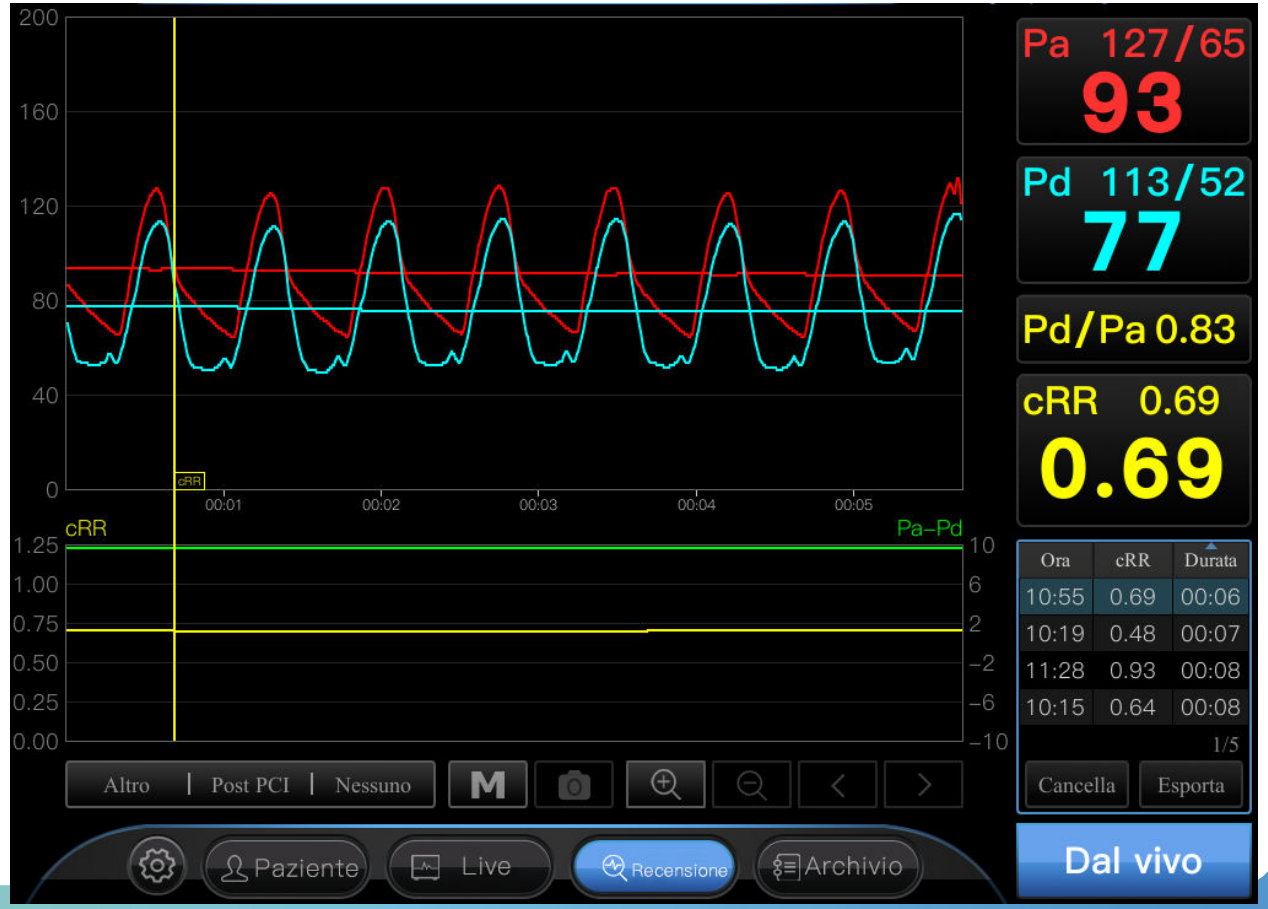


Side branch assessment

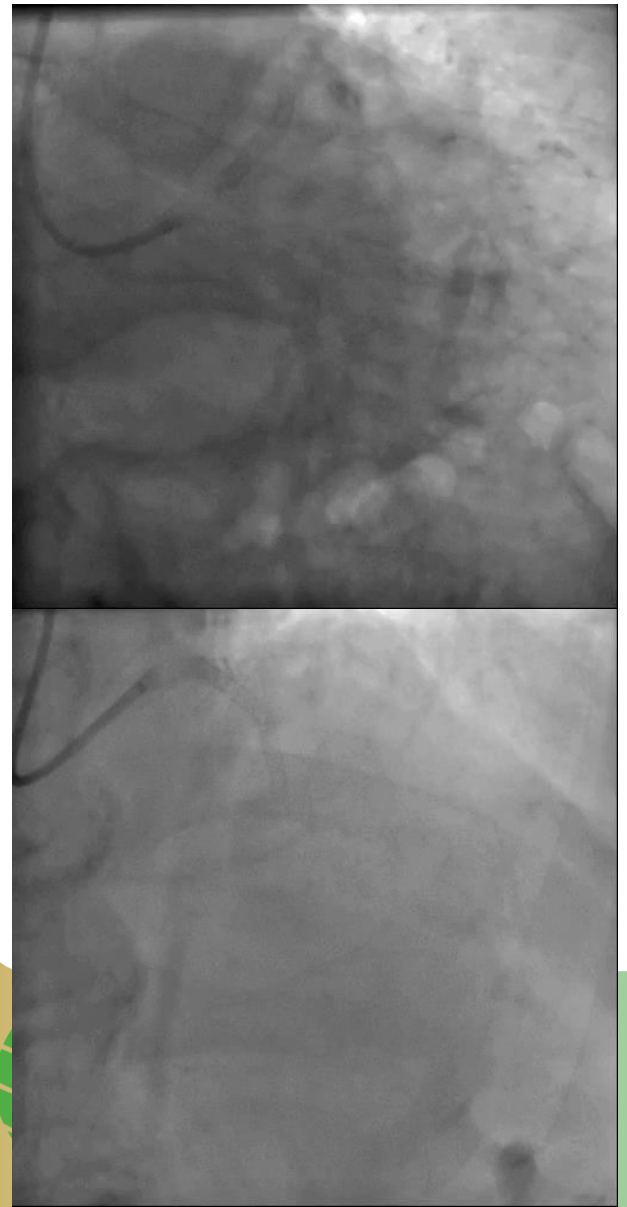
Bifurcation

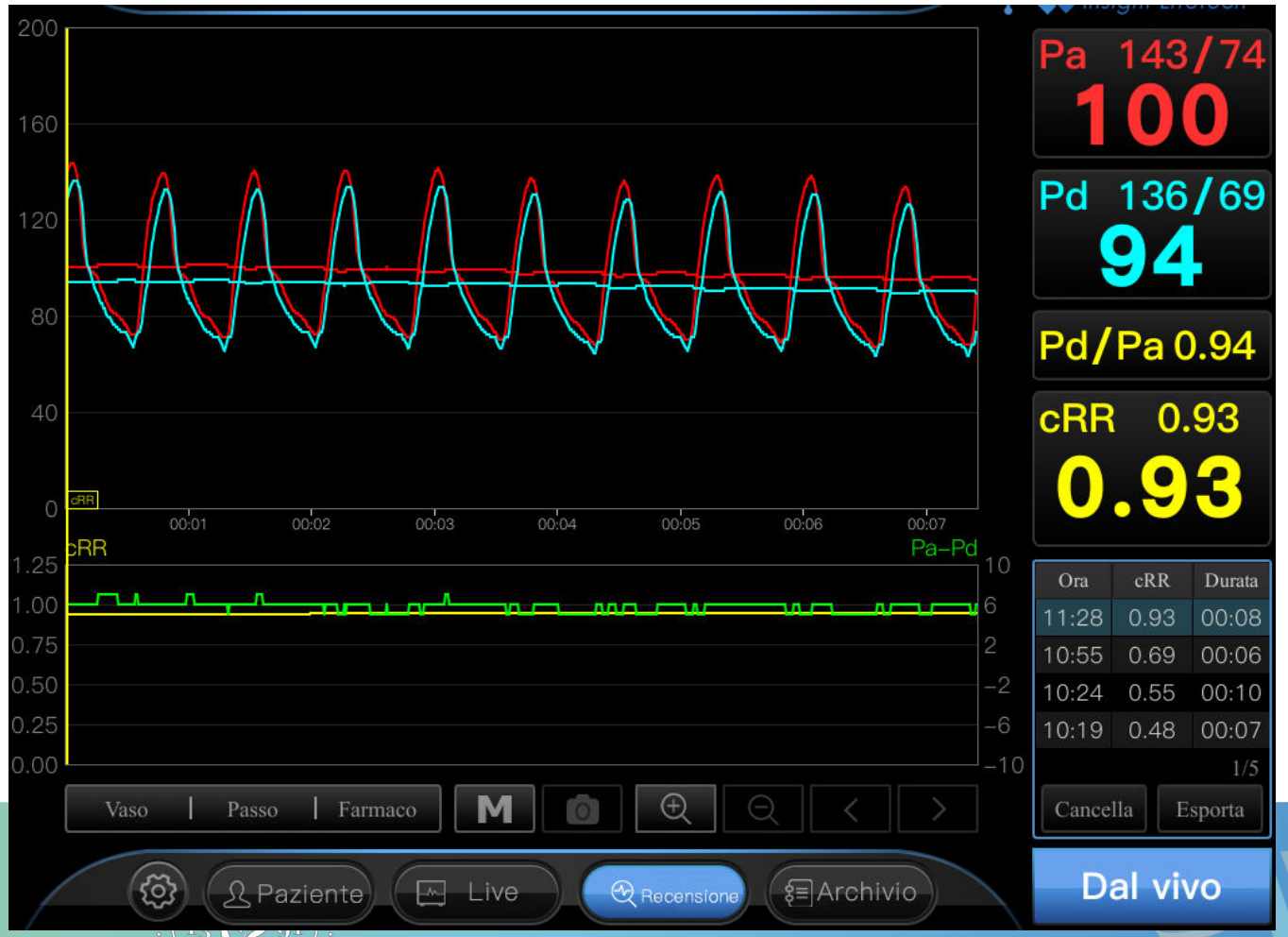
1 vs 2 stent





LCX final




200
160
120
80
40
0
00:01
00:02
00:03
00:04
00:05
00:06
00:07
cRR
Pa–Pd
1.25
1.00
0.75
0.50
0.25
0.00
10
6
2
−2
−6
−10
Vaso | Passo | Farmaco
M
Paziente
Live
Recensione
Archivio
Pa 143/74
100
Pd 136/69
94
Pd/Pa 0.94
cRR 0.93
0.93
Ora cRR Durata
11:28 0.93 00:08
10:55 0.69 00:06
10:24 0.55 00:10
10:19 0.48 00:07
1/5
Cancella
Esporta
Dal vivo

Diffuse disease

Not a surgical candidate: 80 yo, Diabetes, Obesity (BMI 39 kg/m2), CKD Stage 3°, PAD

Ostial lesions

AQVA II trial

INCLUSION CRITERIA

- ✓ Indication to PCI
- ✓ Signed informed consent
- ✓ At least **one CHIP** criteria: *long lesion (>28 mm); tandem lesions; severe calcifications/tortuosity; bifurcation (Medina 1:1:1, SB > 2mm); ISR*

EXCLUSION CRITERIA

- ⊗ Planned or prior surgical revascularization
- ⊗ Culprit lesion of STEMI or NSTEMI
- ⊗ Features limiting QFR computation/use of hyperaemic drug
- ⊗ Revascularization of a CTO
- ⊗ Life expectancy to < 1 year
- ⊗ Any factor precluding 1-year follow-up

2:1 randomization 300 pts

Longitudinal FFR-guided PCI (n=200)	**Angio-guided PCI** (n=100)
❑ PCI planning and optimization with the aim to obtain a final FFR≥0.90 (PIOS)	❑ PCI planning and optimization based on angiography

Co-Primary EP: post-PCI FFR (blinded acquisition)
Secondary EP: VOCE

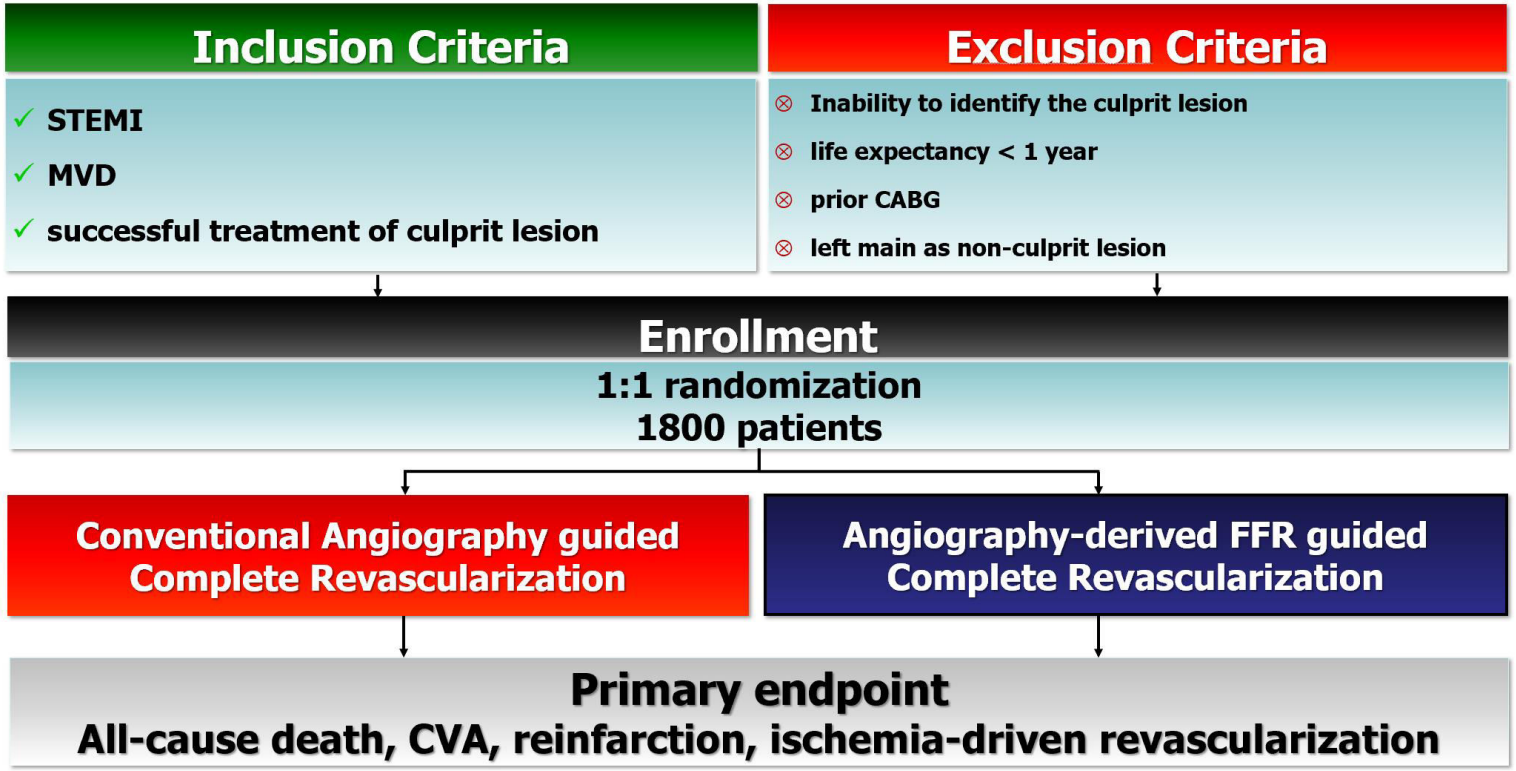
Angiography-derived FFR (n=100)	**Micro-catheter FFR** (n=100)

Co-Primary EP: Post-PCI FFR (blinded acquisition);
Secondary EPs: PIOS feasibility rate

AQVA II

NCL in STEMI

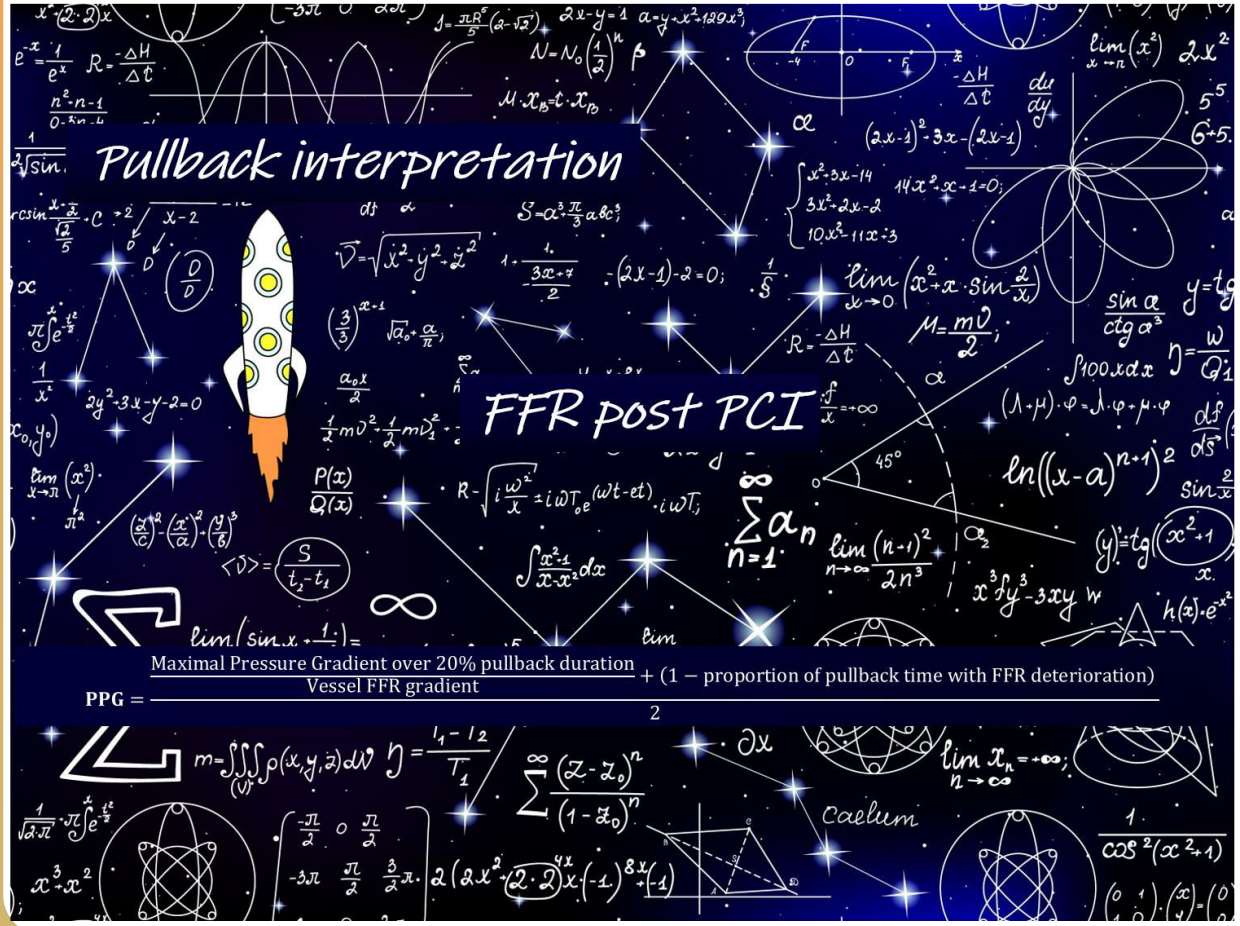
QFR & Virtual PCI: Love is in the...



Sample size: 1800 patients

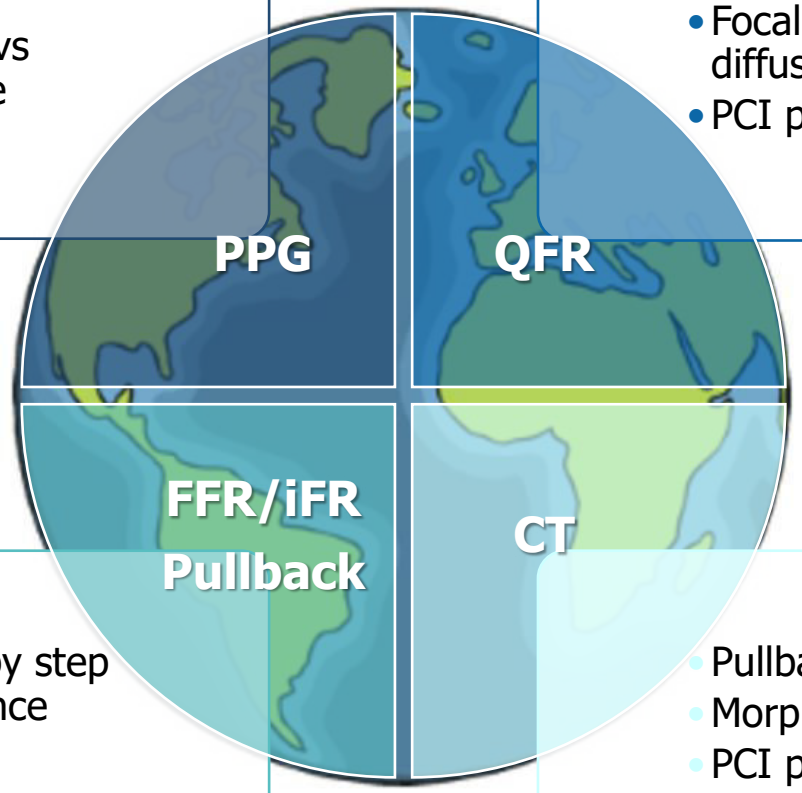
Safety EP: BARC 3-5, CI-AKI, periprocedural MI

The full physiology world



- Focal vs diffuse

- Focal versus diffuse
- PCI plan



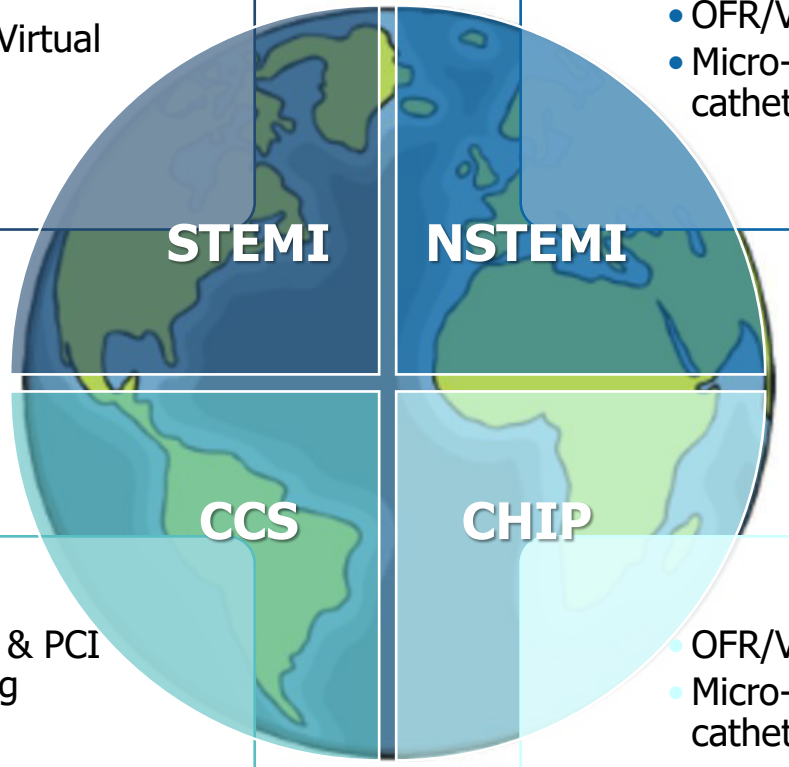
- Step by step guidance

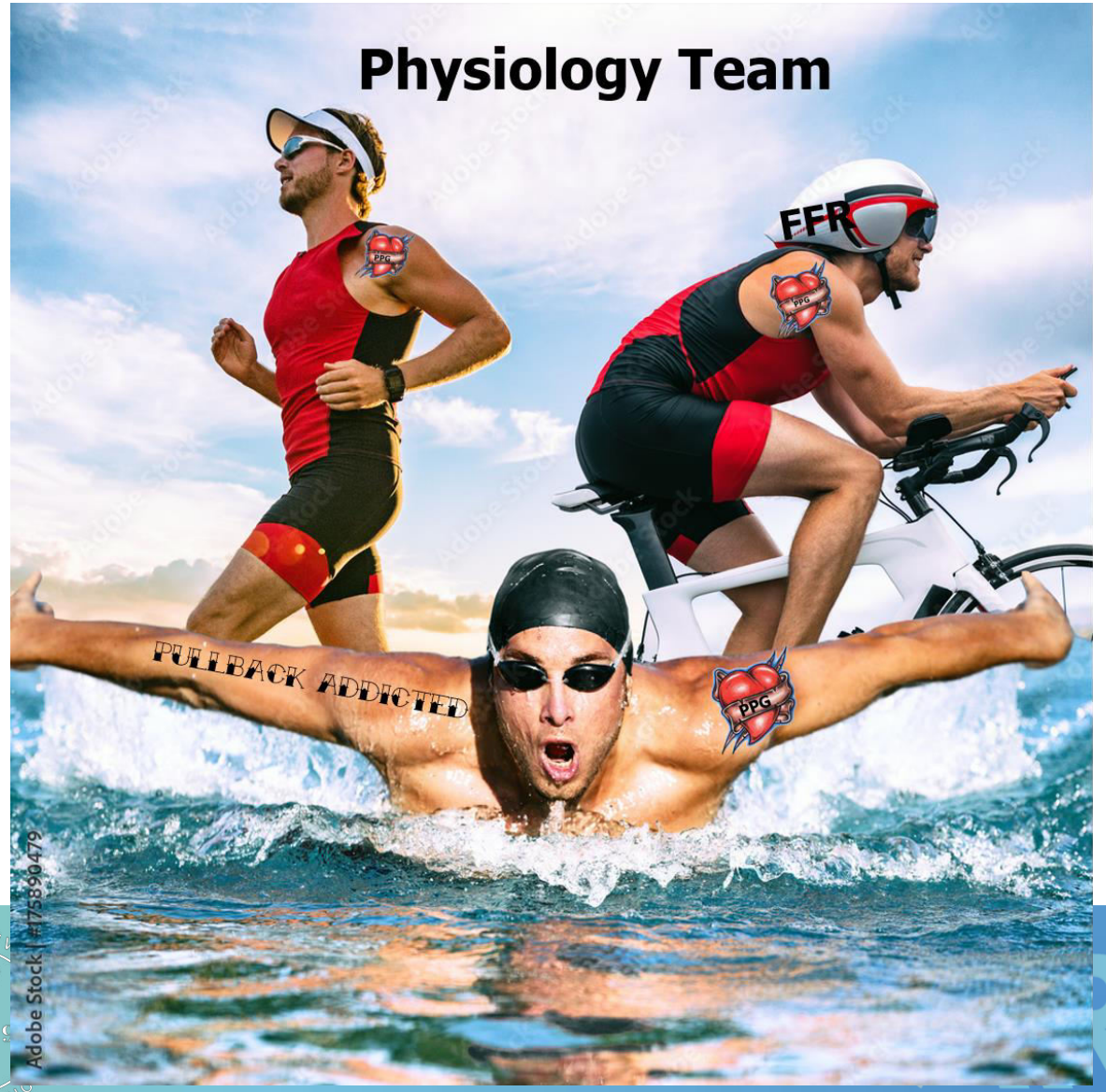
- Pullback
- Morphology
- PCI plan

The full physiology world

- QFR & Virtual PCI

- OFR/VFR
- Micro-catheter



- CT-FFR & PCI planning

- OFR/VFR/UFR
- Micro-catheter