

# INNER SPACES

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### CT FFR

### What is FFR?

Fractional flow reserve (FFR) measurements across a stenotic lesion during catheter angiography help us understand whether an intermediate lesion (40-60%) is functionally significant or not. FFR is the measurement of the ratio of the intra-coronary pressure to aortic pressure during maximum hyperemia. Typically, an FFR < 0.8 is considered significant.

### What is CT-FFR?

FFR measurements obtained during cardiac CT angiography (CTA) are labeled as CT FFR. Since CTA is not a real-time procedure, this is done using complex computational fluid dynamics simulations to arrive at the FFR number.

### How is it done?

There is one company (Heartflow) that is approved to do FFR in clinical situations. There are many other desktop solutions (Siemens, Philips, etc) that are available for research use that use a combination of supercomputing and machine learning (hybrid models)

### How good is CT-FFR?

Multiple studies have shown that CT-FFR has good correlation with the gold standard, i.e. FFR obtained during catheter angiography. More importantly, recent trials have also shown that management decisions guided by CT-FFR have better outcomes than those guided by other traditional methods.

### Limitations

CT-FFR is difficult to perform in patients with stents, post-CABG, occlusions and in those who



Fig. 1 (A,B): CTA (A) shows an 80% proximal RCA stenosis (red arrow) and a 50% stenosis in the LAD (blue arrow). CT-FFR (B) shows a significant drop of pressure across the RCA lesion (red arrow) with a value of 0.78 (less than 0.8) as expected with no drop across the LAD lesion (blue arrow), confirming that the LAD lesion is not significant.

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### At a glance

- FFR is now the gold standard to assess the significance of
  CT-FFR based management decisions have been shown to intermediate / indeterminate coronary artery lesions during catheter angiography
- CT-FFR offers a computer software based, non-invasive

solution to obtain similar results

lead to superior outcomes compared to those using traditional methods



Fig. 2 (A,B): CTA (A) shows calcium in the LAD (red arrow) obscuring the lumen. CT-FFR (B) shows a drop to 0.68 (blue arrow) suggesting that there is significant LAD stenosis to justify revascularization.

move or have high heart rates. It also has challenges in those with coronary aneurysms and severe left main disease.

### Indications

The main indication is to assess whether an indeterminate coronary artery stenosis (40-60%) is significant or not (Fig. 1). CT-FFR is also useful in patients where calcium affects our ability to assess the lumen properly on CTA (Fig. 2).

### The Future

In conjunction with anatomic CTA and CT stress perfusion imaging, CT-FFR may become a onestop shop modality for the assessment of coronary artery and ischemic heart disease.

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