Fractional Flow Reserve, Inflammation and Plaque vulnerability

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Background
The presence of myocardial ischemia and severity of coronary stenoses are important prognostic factors for the occurrence of future myocardial infarction¹. Myocardial infarction occurs when a “vulnerable” atherosclerotic plaque ruptures with abrupt occlusion of the coronary lumen (fig 1).

The key pathological mechanism of vulnerability is inflammation of the atherosclerotic plaque². This is mediated by a host of pro-inflammatory factors and influx of inflammatory cells.

Secretion of these pro-inflammatory factors result (among others) from stimulation of Toll-like receptors (TLR’s), which are an essential part of innate immunity. In this manner, TLR’s have been shown to play an important role in development and progression of atherosclerosis (fig 2).

A relationship between ischemia (as measured by Fractional Flow Reserve (FFR), see fig 3) and TLR responsiveness has been demonstrated³.

Methods
In 150 patients with stable coronary artery disease FFR will be measured and PCI will be performed if appropriate. Blood samples will be taken. Responsiveness of Toll-like receptors on whole blood in vitro and plasma levels of pro-inflammatory factors will be measured before FFR/PCI and 6 weeks after the procedure.

Expression of markers of activation on cell surfaces will be measured by flow cytometry before PCI and after 6 weeks (see fig 4).

Progress
At this point in time, 66 patients have been included.

References:

Aim
To investigate the relationship between myocardial ischemia (as measured by FFR) and TLR-responsiveness together with plasma levels of pro-inflammatory factors in patients with stable coronary artery disease.