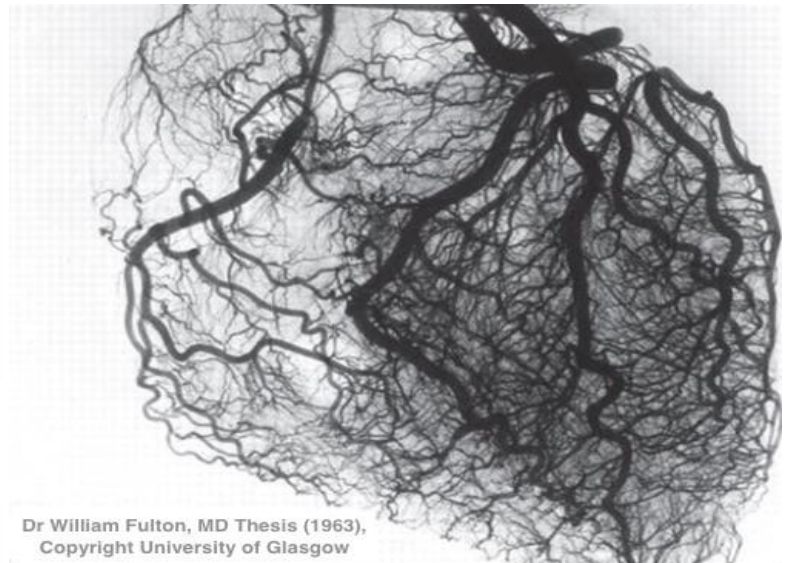
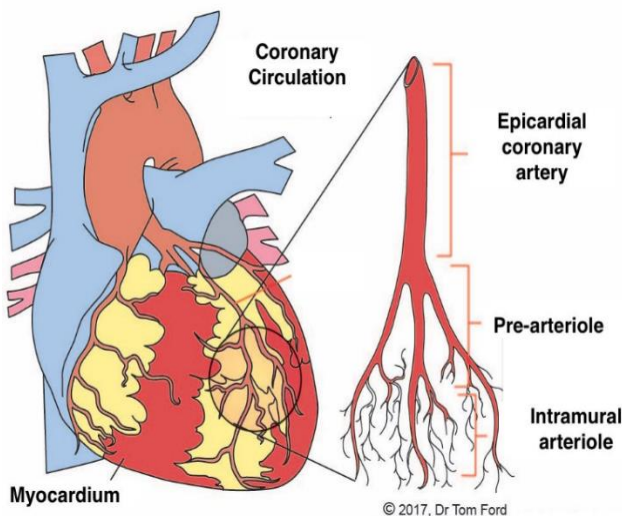


## Ischemia with No Obstructive Coronary Artery disease (INOCA)

**INOCA** refers to patients with signs and symptoms of blood supply problems (ischemia) to the heart muscle without significant blockage of the large arteries of the heart. INOCA can cause symptoms of heart pain (angina) including chest pain, chest tightness, neck/shoulder/arm/back pain, shortness of breath, fatigue or other related symptoms. Signs of ischemia include a positive blood test for heart damage (troponin), or positive cardiac stress test. However, a stress test can miss INOCA so recurrent symptoms even with a negative stress test can be due to INOCA.

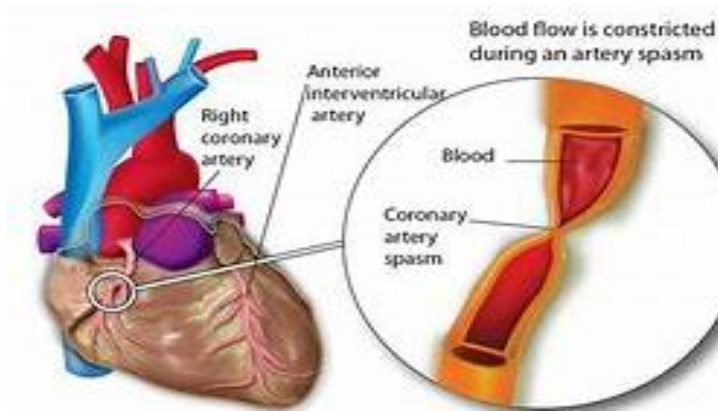
INOCA is more common in women but also affects men. Many patients with INOCA have been falsely reassured because of negative cardiac testing, including a coronary angiogram that did not show significant blockage, and therefore it is important that they seek expert opinion.

## MICROVASCULAR ANGINA & CORONARY MICROVASCULAR DISEASE (CMD)



Many patients with INOCA have microvascular angina often caused by **coronary microvascular disease (CMD)**, which is disease of the small heart arteries (coronary microcirculation). In patients with CMD the small heart arteries are unable to dilate as expected to allow increased blood flow when required-for example during exercise or at times of stress resulting in recurrent symptoms like chest pain.

## VASOSPASTIC ANGINA or PRINZMETAL ANGINA



Many patients with INOCA have **vasospastic disease** which results from excessive coronary vasoconstriction affecting one or more segments of the large heart arteries. Patients with coronary spasm usually have angina at rest, mainly during the night or early morning hours and may have a normal exercise tolerance, with no chest pain on exertion.

### DIAGNOSIS: INVASIVE FUNCTIONAL ANGIOGRAPHY

Invasive functional angiography (IFA) also referred to as coronary reactivity test (CRT) is an angiography procedure in the catheterization laboratory, to evaluate the coronary artery microcirculation and how the blood vessels respond to different medications. Cardiologists use this information to distinguish different types of blood vessel reactivity and dysfunction. The results of this test enhance a cardiologist's ability to diagnose and treat patients with coronary microvascular disease or vasospastic disease and provide more specific treatment for symptoms.

### SIGNIFICANCE OF INOCA

INOCA affects a significant proportion of the population with an estimated 3-4 million people thought to have undiagnosed INOCA in the US. Studies suggest a 4-5 times increased risk of major adverse cardiovascular events (MACE). Patients with INOCA often have significantly impaired quality of life. INOCA patients undergo multiple unnecessary emergency room visits and diagnostic investigations.

### TREATMENT AND NEED FOR FURTHER RESEARCH

Treatment of INOCA and the underlying small artery disease remains a major unmet need, but strategies do now exist that can help improve patients' symptoms and quality of life. Further research is needed to have a clearer understanding of the cause and treatment of INOCA which will hopefully translate into improved care for patients. The Christ Hospital Women's Heart and Lindner Research Center is leading pioneering research to improve treatment of INOCA patients.

For more information contact the **Women's Heart Center at 513-585-2140**

To learn more, please visit:

[TheChristHospital.com/womens-heart](http://TheChristHospital.com/womens-heart)

<http://www.INOCAInternational.com>