INTRODUCTION

- Ischemic Heart Disease (IHD) manifests as a spectrum of presentations ranging from asymptomatic states to sudden cardiac death.

- Stable Coronary Artery Disease (CAD) is a condition not associated with acute, unstable or progressive cardiac events.

- Presentation: Exertional angina pectoris, atypical chest pain, dyspnea, fatigue, or reduced effort tolerance.

- Can be asymptomatic, abnormal findings on ECG, CT Scan or Exercise ECG.
IHD leading cause of death globally
Most typical discomfort/pain zones

Heavy pressure, tightness, crushing pain or unusual discomfort in the centre of the chest

Sweating, sickness, faintness or shortness of breath may be experienced

Other possible discomfort/pain zones

This may feel like indigestion, spread to shoulders, arms, neck or jaw and/or last for more than 15 minutes. It may stop or weaken and then return

There may be a rapid, weak pulse

Sharp stabbing pain in the left side of the chest is usually NOT heart pain

Symptoms of Ischemic Heart Disease

http://www.heartfoundation.co.za/how-your-heart-works/symptoms-heart-attack (accessed on 7 Feb 2013)
ECG Diagnosis

* lack of blood supply leads to permanent myocardial infarction

Q* vs. Non-Q MI

STEMI vs. NSTE-ACS

Clot within the main lumen of the coronary artery

Ruptured plaque with hemorrhage

Adapted from J Davies (pathological specimen)
ECG
# TABLE 1

| Class I (no limitation of ordinary activity) | Angina reproduced with strenuous exertion |
| Class II (slight limitation of ordinary activity) | Angina reproduced on walking rapidly |
| Class III (marked limitation of ordinary activity) | Angina reproduced on walking 100-200 m |
| Class IV (inability of activity) | Angina reproduced for any activity |

**Severity of Angina according to Canadian Cardiovascular Society**
<table>
<thead>
<tr>
<th>Test</th>
<th>Utility</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood exams</td>
<td>Control disease progression and ischemia triggers</td>
<td>Every patient, every year</td>
</tr>
<tr>
<td>ECG</td>
<td>Discover ischemic signs and prognosis</td>
<td>Every patient, every year</td>
</tr>
<tr>
<td>Echocardiography</td>
<td>Exclude other cardiopathy and evaluate ejection fraction</td>
<td>Every patient</td>
</tr>
<tr>
<td>Stress test</td>
<td>Diagnosis and stratification</td>
<td>Diagnosis and follow-up of high risk patients</td>
</tr>
<tr>
<td>Angiography</td>
<td>Revascularization or anatomy investigation</td>
<td>Uncontrolled symptoms or possible complex lesions or high risk patients</td>
</tr>
</tbody>
</table>

Main tests in stable Ischemic Heart Disease
<table>
<thead>
<tr>
<th>Non-invasive test</th>
<th>High-risk outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exercise Treadmill</strong></td>
<td>&gt;2 mm of ST depression at low workload</td>
</tr>
<tr>
<td></td>
<td>Exercise-induced ST elevation</td>
</tr>
<tr>
<td></td>
<td>Exercise-induced ventricular tachycardia/fibrillation</td>
</tr>
<tr>
<td></td>
<td>Failure to increase blood pressure &gt;120 mmHg or sustained decrease &gt;10 mmHg during exercise</td>
</tr>
<tr>
<td><strong>Myocardial perfusion imaging</strong></td>
<td>Resting perfusion abnormalities &gt;10% of the myocardium</td>
</tr>
<tr>
<td></td>
<td>Stress-induced perfusion abnormalities &gt;10% of the myocardium or indicating multiple coronary obstruction</td>
</tr>
<tr>
<td></td>
<td>Severe stress-induced left ventricular dysfunction</td>
</tr>
<tr>
<td><strong>Stress echocardiography</strong></td>
<td>Inducible kinetic abnormalities involving &gt;2 coronary beds</td>
</tr>
<tr>
<td></td>
<td>Kinetic abnormalities developing at low dose of dobutamine</td>
</tr>
<tr>
<td><strong>Coronary computed tomographic angiography</strong></td>
<td>Multi-vessel or left main stenosis</td>
</tr>
</tbody>
</table>
RCA Angiogram

LAO 40

RAO 30
How can we access the lesion?

1. QCA
2. Physiology
3. Imaging (IVUS or OCT)
   - Lumen Diameter and Lumen Area
   - Vessel Diameter and Vessel Area
   - Lesion length
NO MAXIMAL HYPEREMIA
Is PCI as good as Medical Therapy in addressing Ischemia?

The COURAGE trial showed that angiographic guided PCI was comparable to optimal medical therapy (MT) at preventing MACE.1

LAD: 50–70% Stenosis

Table 1: Kaplan-Meier survival curves. The estimated rate of composite primary outcome of death from any cause & non-fatal infarction was 19% in the PCI group and 18.5% in the medical therapy group. (Numbers in table represent the patients at risk each year.)

<table>
<thead>
<tr>
<th></th>
<th>PCI</th>
<th>Medical Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1149</td>
<td>1138</td>
</tr>
<tr>
<td>1</td>
<td>1013</td>
<td>1017</td>
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<tr>
<td>2</td>
<td>952</td>
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<td>5</td>
<td>417</td>
<td>408</td>
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<tr>
<td>6</td>
<td>200</td>
<td>192</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>30</td>
</tr>
</tbody>
</table>

Hazard ratio: 1.05 [95% CI: 0.87, 1.27]; P=0.62

FFR-Guided PCI leads to 35% Risk Reduction in Death and MI Compared to Angio Only¹

Routine adoption of FFR in clinical practice allows the physician to make the **RIGHT DECISION** for the **RIGHT PATIENT**, at the **RIGHT TIME**

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PressureWire Guided PCI is Superior to Medical Therapy Alone

The rate of MACE (any death, non-fatal MI and/or urgent revascularization) at 2 years was significantly lower with FFR-guided PCI + MT than MT alone (8.1% vs 19.5%) p < 0.001

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Normal Artery Wall

3 Layers
Diseased vessel: Plaque Geometry

Concentric Plaque

Eccentric Plaque
- Vessel diameter adventitia to adventitia
- Lumen diameter intima to intima

Diameter measurement
IVUS Images

- Calcium with shadow
- Stent
- Thrombus
MEDICAL MANAGEMENT OF STABLE CAD

- (COURAGE TRIAL)
  → OMT for stable CAD results in similar rates of survival and myocardial infarction compared to Percutaneous Coronary Interventions (PCI)

- Relieved angina symptoms, reduce death myocardial infarction and stroke rates.

- More intervention at 5 years in medical group.
- **Anti anginal drugs**
  Beta blockers, calcium channel blockers, nitrates, Ivabradine etc.
  (Triple anti angina therapy considered in very symptomatic patient)
- **Antiplatelet and lipids lowering drugs**
- **Risk factors management**
  High Blood Pressure, Dyslipidemia, Diabetes, Smoking,
  Weight Reduction, Regular Physical Activities
Patients with refractory symptoms to OMT.

Revascularization in addition to OMT achieves a greater reduction in ischemic burden compared to OMT alone, better left ventricular function.
- CABG is preferable to PCI for multi vessels disease and left main Coronary Artery Disease, in diabetic patient, high and anatomical complexity or high syntax scores.

- Survival benefit with CABG has been found in high risk patients at long term (after 5 years).

- PCI in less complex CAD, less diffuse disease low syntax score and low burden of disease.
Neither PCI nor CABG alone can provide a solution for the entire spectrum of CHD who needs revascularization.

In many situations the choice will remain debatable. Recent trials and ongoing trials with newer generations of DES indicate that both modalities are equivalent in most cases in terms of survival, MI or Angina.
- Optimizing coronary interventions with invasive functional assessment by iFR/FFR and Coronary Imaging by IVUS/OCT

- Fluoroscopy alone is often insufficient for decision making and treatment.

- iFR/FFR provides functional evaluation of serial stenoses, IVUS and OCT allows assessment of plaque, strategy for PCI and Post PCI treatment optimization.
Optimal Medical Therapy is necessary in all patients with stable CAD, whether or not they receive revascularization of any type Percutaneous Coronary Interventions (PCI) or Coronary Artery Bypass grafting (CABG).

In all cases of choosing revascularization strategies, a patient centered approach with informed consent about all reasonable options should be taken.

Randomized trials and controlled observations have defined many of the subset of patients who will benefit from PCI and others who may be better managed with medical therapy or bypass surgery.
THANK YOU