Myocardial Ischemia

Cardiac Ischemia
Imbalance between the blood supplied to the heart and its metabolic demand.

Symptoms
- No symptoms (silent ischemia)
- Chest, neck, shoulder pain
- Shortness of breath
- Nausea and vomiting

Causes
- Coronary artery disease (atherosclerosis)
- Blood clot (thrombosis)
- Arterial inflammation
- Coronary spasm

Diagnosis
- Electrocardiogram (ECG), Exercise Testing (ET)
- Blood tests
- Echocardiogram
- Nuclear scan
- Coronary angiography
- Cardiac CT

Treatment
- Aspirin (blood thinner)
- Nitroglycerin (expands blood vessels)
- Beta blockers (lowers blood pressure)
- Angioplasty (PCI) and stenting
- Coronary artery bypass surgery (CABG)

Clinical Setting
- Diagnostic errors of 30-50%
- ECG is often normal or non-specific in patients with cardiac ischemia

Research Overview
- Acute ischemia animal model studies using high resolution mapping of cardiac potentials.

Research Motivation
- Ischemia originates in the sub-endocardium and progresses uniformly towards the epicardium
- Current ischemia model does not explain the clinical and experimental results.
- Characterize the electrical signature of cardiac ischemia.

ST elevation
ST depression
Transmural ischemia
Non-transmural ischemia

Current model of cardiac ischemia