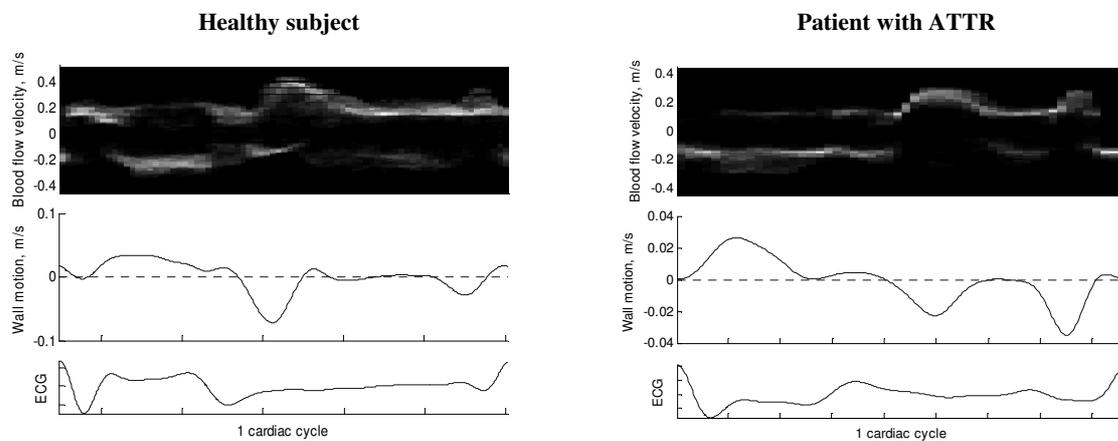


## SIMULTANEOUS ULTRASONIC QUANTIFICATION OF CARDIAC HEMODYNAMICS AND MECHANICS

Cardiovascular diseases are the number one cause of death in the world representing 30% of all global deaths. The most common causes of death in Western countries (and causes of hospital admissions) is coronary heart disease, and around 2% of adults in western countries suffer from heart failure, but in those over the age of 65, this increases to 6—10%. The information on blood flow and myocardial motion can be used to assess the cardiac function (measured separately in time). However, there is often high variability in heart rate, respiration, and load between consecutive heart beats. Therefore, there is a need for simultaneous analysis of the blood flow and myocardial motion, in order to improve clinical assessment of cardiac function.

The *general aim* of this project is to develop engineering or technical methods for improved analysis of cardiac function in healthy and diseased humans based on the simultaneous information on cardiac blood flow and myocardial motion.



**Figure 1:** Simultaneous mitral blood flow velocity (upper figure), septum wall motion (middle), and ECG for a single heart beat. Left figure is for a typical healthy subject, and right side is for a patient with hereditary transthyretin amyloidosis (ATTR or FAP).

Figure 1 illustrate typical examples on simultaneous blood flow velocity and wall motion. The wall motion of the healthy subject precedes the blood flow due to suction mechanism of blood into the left ventricle during diastole, while the patient has no time differences between the filling blood flow and wall motion, indicating disturbed filling pressure.