



FROM VISION TO DECISION

## SEMINAR FRIDAY 12.09.2014

**PLACE:** MedViz Facilities., Møllendalsbakken 7, 5<sup>th</sup> floor

**TIME** : 12:00-13:00

### SPEAKERS/TITLES

**Postdoc Erlend Hodneland**

**Title:** "Mathematical modelling in medical image analysis»

**Professor Odd Helge Gilja**

**Professor Knut Matre**

**Title:** "Mathematical modelling and cardiac imaging»



### ABSTRACT

#### Hodneland

Image based diagnosis will become increasingly important in the future. In this respect, mathematical and numerical modelling of physiological processes and tissue physical properties is a powerful tool to explore higher dimensional image recordings and to support clinical diagnosis and treatment planning. One aspect of mathematical modelling is to describe normal and abnormal tissue function like perfusion and filtration in e.g. kidney disease. Another perspective is the quantitative description of microscopical tissue properties like diffusion and leakage in stroke and cancer. Yet another application is the determination of tissue stiffness and elasticity characteristics reflecting sclerosis and fibrosis, as performed in ultrasound and MR elastography. Due to the wide range of important applications for such mathematical modelling in image data, I will focus my postdoc period in MedViz on these challenges.

#### Gilja

Improving tissue characterization is an important objective in medical imaging, analysis and visualization. In ultrasonography, elastography has evolved as a clinical tool to estimate tissue hardness. The elastic properties of tissue can convey significant information about the malignant potential of a tumor or help to decide whether a lesion of the GI tract is inflammatory or fibrous in origin. In this lecture, it will be demonstrated clinical applications of elastography using ultrasound to guide management of patients with digestive diseases.

#### Matre

Making a mathematical model of the heart is difficult! It requires modelling several components including the electrical component, the tissue component and the fluid component. One of the challenges has been the coupling of these components. New tools and increased computer processing power has led to more use of modelling in cardiology. This will be discussed including the relationship to imaging modalities.

