

Project 1: Apnea Animal model Project 2: Lymph vessel visualisation



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Project 1: Apnea Animal model

Approximately 175 million Europeans and staggering >900 mio worldwide (ref: WHO) have obstructive sleep apnea, a chronic condition characterised by regular pauses in breathing during sleep and associated with an increased risk of mortality. Apnea has been associated with a large number of systemic diseases, including cardiovascular diseases, diabetes and cancer.

The aim of this study is to develop an animal model of sleep apnea that mimics intermittent hypoxemia in humans.

Method

The study will include healthy and obese rats. Literature of $SaO_2(\%)$ values from humans suffering obstructive sleep apnea will be used as human references. Saturation measurements in rats will be implemented. Intermittent hypoxemia will be performed using a homebuilt chamber (see photo), allowing rapid shift of air (20% to 4% air) within seconds. Short- and long-term haemodynamic/cardiovascular parameters will be measured by microultrasound.



Project 2: Lymph vessel visualisation

Lymphatic vessels complement blood vessels by absorbing fluid, proteins, and cells (collectively known as lymph) from the interstitial space. Only very recently it has been possible to use state-of-the-art MRI imaging systems to carefully delineate the lymphatic system. It has been shown that the structure of lymph vessels are associated with heart diseases. Today, we do not know how we define a normal and adapted lymphatic system.

The aim of this study is to demonstrate a new way to evaluate and quantify the density and tortuosity of major lymph vessels.

Method

The study will include existing data from healthy and heart disease patients, where MRI has been performed. The image below shows an example of a heart disease patients with a complicated thoracic duct structure.

Image analyses will be performed with new image tools, and the method will be evaluated using phantom models with known "vessel" diameter and tortuosity.



Research environment

Comparative Medicine Lab (Skejby) offers a transdisciplinary research environment, with affiliated researchers/students that include engineers, biologists and medical doctors.