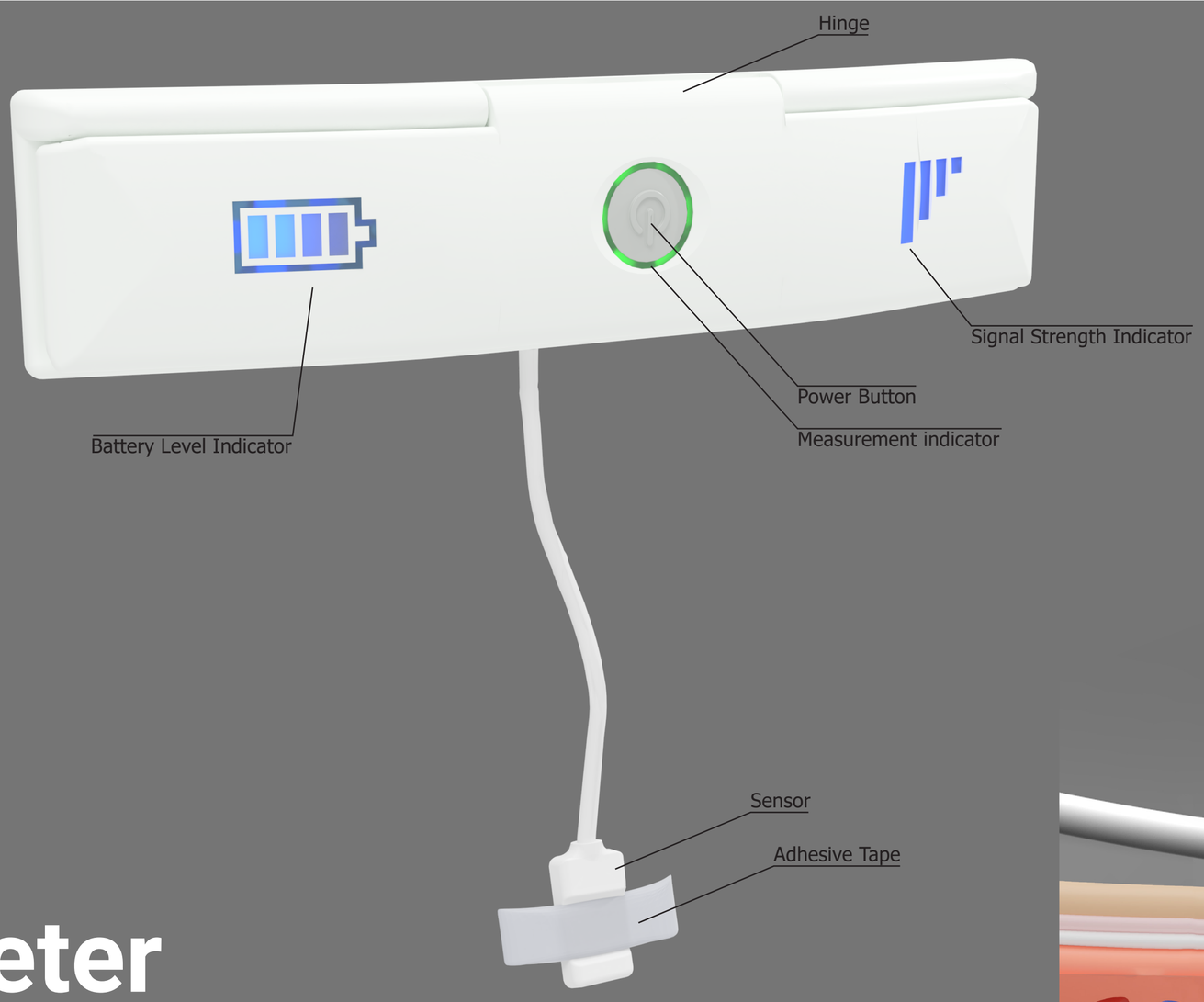
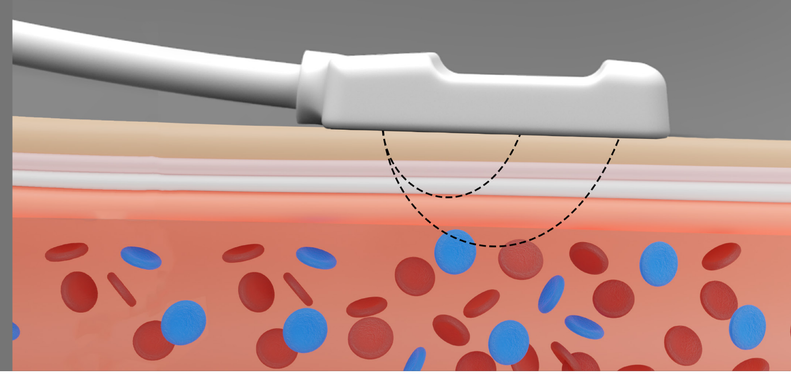




Erectiometer

A diagnostic device to measure nocturnal erections

The project is in collaboration with Urologists at the Erasmus MC in Rotterdam. The design goal was to develop a diagnostic device that can be used to measure nocturnal (i.e. nightly) erections. The current device used to measure nocturnal erections was developed in the 1980s. There is a need for a modern tool that can be used in the diagnosis of erectile dysfunction.

Erectile Dysfunction

Erectile Dysfunction (ED) is the inability to achieve or maintain an erection sufficient for sexual activity.

9%
of Dutch Men

Nocturnal Erections

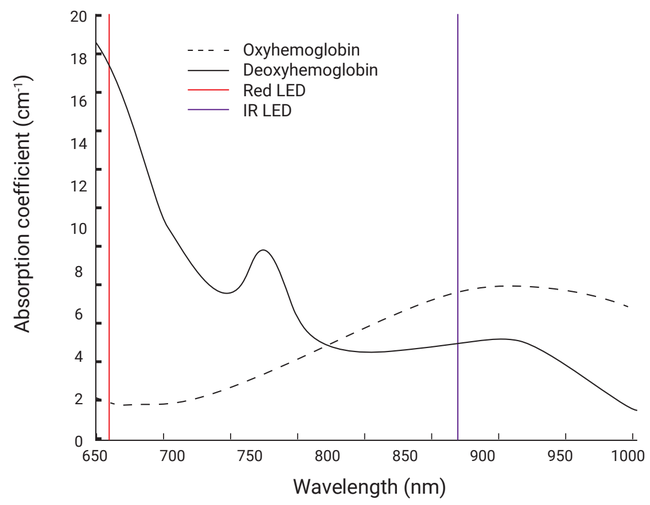
The Erectiometer is designed to monitor nocturnal erections. Healthy men have between 3 to 6 erections every night. They are not caused by sexual stimuli.

Physiology

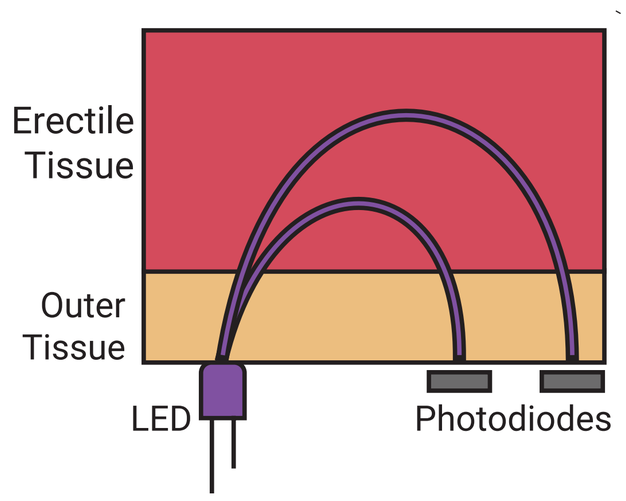
During an erection there is a large increase in blood flow to the penis. This results in an increase in the concentration of oxygen in the tissue. This change in blood oxygen can be measured in a non-invasive way.

Tissue Oximetry

Tissue oximetry measures oxygen saturation in tissue (STO_2). Tissue oximetry is based on the different light absorption spectra of oxygenated blood compared to deoxygenated blood.



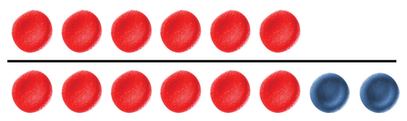
The tissue oximeter has a Red and an IR LED, as well as two photodiodes. The LEDs emit light into the tissue.

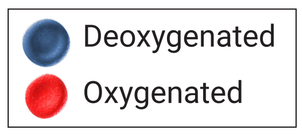


Some of the light emitted by the LEDs reaches the photodiodes. When the light travels a larger distance, to the far photodiode, more of the light is absorbed and scattered. The difference in the light that reaches the close and far photodiodes allows us to calculate the absorption of light in the erectile tissue.

Based on the absorption of the red and IR light in the erectile tissue, the concentrations of oxygenated and deoxygenated blood can be calculated. The ratios of these concentrations give the STO_2.

Blood Oxygen Saturation (STO_2) =



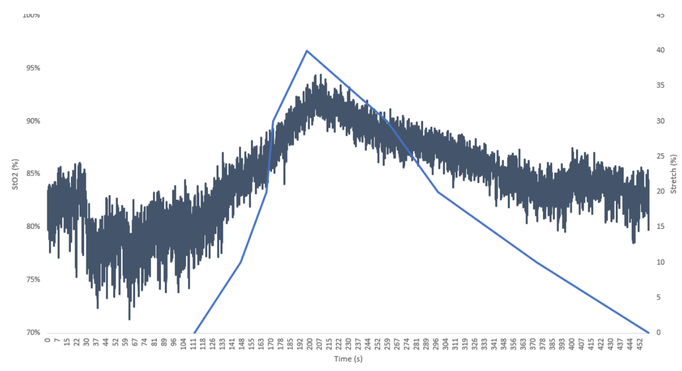


Results

My results show that in the flaccid penis the average STO_2 values are between 75% and 85%, and in the erect state the average STO_2 values are between 90-95%. There is a rise in STO_2 values during an erection and there are clear differences in STO_2 between the flaccid and erect state.

Validation

I took direct circumference measurements using a flexible measuring tape with marks indicating the 10%, 20%, 30%, and 40% circumference increase. I compared the STO_2 measurements with the circumference measurements to confirm that a rise in STO_2 valves, actually corresponded with an erection event.



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