Translational Research with the MouseOx® Plus
18 Oct 11

Description of Translational Research

In very simple terms, the goal of translational research is to take research from the lab bench to the hospital bedside as quickly as possible, but also, to take observations from the clinic back to the research lab. There are a number of ways to make this happen:

- Use equipment and techniques in research that can be translated directly into clinical practice
- Integrate knowledge and experience from many different research disciplines in order to accelerate development of beneficial clinical diagnoses and treatments
- Increase collaboration, data sharing and a closer relationship between the clinical and the research lab

How the MouseOx® Plus Fits into Translational Research

The MouseOx® Plus can be an integral part of translational research:

- Pulse oximetry is a universally accepted clinical diagnosis and monitoring modality from emergency response through surgery to post-op care. It is also often the sole monitor used in conscious sedation (e.g., dental office sedation).
- Pulse oximetry has only been available for use on mice and rats within the last few years, with the introduction of the MouseOx® Small Animal Pulse Oximeter
- The MouseOx® and MouseOx® Plus oximeters have been used in a wide range of research applications including:
    - Influenza, Pnemonia, RSV & Other Acute Respiratory Disorders
    - Lung Injury
    - Lung Cancer, COPD, Sleep Apnea & Other Chronic Respiratory Disorders
    - Shock Models
    - Stroke & Brain Injury
    - Hypertension, Hypotension & Other Cardiovascular Disorders
    - Hypoxia & Inhalation Studies
    - Vital Signs Monitoring During Imaging
    - Vital Signs Monitoring During Surgery & Experiments Requiring Anesthesia
    - Pharmacology & Toxicology Studies
- Pulse oximetry on rodents has been conducted widely in the research lab, and there is interest in its use in pre-clinical animal trials

Principles of Pulse Oximetry

Several types of pulse oximeters were developed in the mid 1900's, but the modern version used throughout hospitals today was invented in 1972. In 1980, modern pulse oximetry was first commercialized, making it readily available - it quickly grew in popularity. Because of its ease-of-use, low cost and non-invasive nature, pulse oximetry is mandated in nearly all hospital and homecare patient care guidelines. In the hospital, this includes first responders to post-operative and critical care monitoring.

Pulse oximetry is a technique for monitoring the level of oxygen carried to the tissues on hemoglobin molecules in red blood cells. Since 97% of oxygen is carried on hemoglobin, pulse oximetry provides a very robust assessment of arterial oxygenation. This is fortunate, because the alternative for monitoring arterial oxygen, an indwelling arterial catheter, is highly undesirable.

In pulse oximetry, the saturation is measured directly (not through a table or other function) with the use of 2 different wavelengths of light. One is red, which you can see, and the other is infrared, which you cannot. The absorption of light by hemoglobin changes based on the degree of oxygen bound to the hemoglobin. Most people are familiar with the fact that de-oxygenated blood appears much darker than fresh blood. These variations can be tied back to the level of hemoglobin saturation through calibration that can be performed by the manufacturer, obviating the need for the user to do so.

Moreover, the word "pulse" in pulse oximetry refers to the fact that the light absorption received by a pulse ox sensor oscillates with the cardiac pulsation. Because blood pulsation is completely damped by the time blood enters the capillary bed, the pulsating signal can only arise from the arterial system, and therefore measurements are made only on arterial blood and not on tissues, capillary blood or venous blood.