Calibrated In Vivo Blood Oximeter

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Technology description

Invention

A calibrated in vivo blood oximeter that is accurate to 1% SO2. The technology based on a sensing surface that detects individual red blood cell refractive index. The sensing surface works on the principle of surface Plasmon resonance for individual red blood cells (RBCs), which is insensitive to RBC concentration and size, as well as other factors that make commercially available instruments for measuring in vivo SO2 inaccurate. The mechanical dimensions of the new device are similar to probes currently being used with standard catheters, so the device should be immediately useful when fully developed. In addition, the invention allows investigation of individual RBCs in vivo, which was heretofore not possible. Our device is a disposable catheter-based probe that accurately (within 1%) monitors SO2 that can be implemented through standard procedures already developed for other types of monitoring and surgical devices. It avoids problems inherent with less-accurate in vivo devices, where they are plagued with signals that depend on various factors. It works on the principle of plasmonic resonance, which has been used in other instruments to accurately and sensitively monitor contaminants, like poisonous gasses and harmful biological organisms.

Background

Monitoring oxygen saturation (SO2) is extremely important, especially in point-of-care (POC) situations, like monitoring sepsis, in intensive care units (ICU), during surgery or in emergency care situations. What is needed is a reliable POC device that provides the physician with up-to-date and accurate information about blood oxygen. To date, accurate devices that determine blood oxygen level are only available by first drawing blood from the patient, transporting the blood to a co-oximeter, and then transmitting the information back to the physician. This delay could be devastating in many situations. A real-time bedside in vivo POC blood oxygen monitor could instantly inform the physician of the situation to adjust treatment and possibly save lives.

Application area

Provides an apparatus that facilitates measuring the hemoglobin oxygen saturation and the incidence of hemoglobinopathies in RBCs that has not been available before.

This in vivo device is as accurate as a co-oximeter and can be used to continuously monitor oxygen in the blood at the bedside.

Can allow new insights into diseases by characterizing various species of hemoglobin in the RBCs, and imaging its variation at the sub-cellular level.

Advantages

First probe that accurately measures oxygen saturation of red blood cells in vivo.
Could instantly inform the physician of the situation to adjust treatment and possibly save lives.
This instrument provides accurate in vivo monitoring; the new device should extend clinical investigation for medical researchers, where they will be able study characteristics of individual red blood cells in the body.

Institution

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