Blood Clotting

Life-saving device continuously checks a patient’s blood clotting status during and after surgery

UCF researchers have developed a breakthrough early-detection system that helps detect life-threatening blood clots during and after a medical procedure. Conventional laboratory blood coagulation tests are time-intensive, requiring blood to be drawn, processed and analyzed. The UCF real-time blood coagulation monitor continuously monitors a patient’s blood coagulation status and eliminates the need for blood withdrawal and sample processing. By enabling real-time assessment, the technology avoids operational delays and could facilitate timely diagnosis and early clinical intervention. The technology has been tested in several clinical settings, most recently at Arnold Palmer Hospital for Children.

Blood clots (venous thromboembolisms or VTEs) are a major risk for hospitalized patients and are one of the leading causes of preventable hospital deaths. According to the Centers for Disease Control and Prevention, blood clots kill up to 100,000 Americans each year and affect as many as 900,000 people.

Anyone, regardless of sex, age, race or ethnicity can develop a blood clot.

Technical Details

The robust and inexpensive monitoring system uses a low-coherence dynamic light scattering technique (LC-DLS) to monitor a patient’s blood. The system’s solid-state laser technology easily integrates with existing vascular access devices or laboratory equipment. Medical staff can use the system to monitor blood coagulation status in vivo during and after a medical procedure. The invention also enables in vitro blood testing and pre-surgical screening for risks associated with excessive bleeding during surgery.

The coagulation monitor consists of a sample probe containing an optical fiber, an optical detector, and a dynamic light signal analyzer. The probe transmits low-coherence light through the optical fiber into the blood. Light scatter signals generated by the circulating red blood cells (in vivo) or blood sample (in vitro) are received by the optical fiber, detected by the optical detector, and analyzed by the dynamic light signal analyzer. The analyzer compares the light scatter signals to a predetermined coagulation value or range and then reports the coagulation status of the blood and/or clotting time. The system also accommodates multiplexing with other optical assays.

Benefits

• Real-time feedback and analysis
• No sample preparation or manipulation
• Non-invasive and requires only a small volume of blood
• Integrates with existing blood access devices for continuous in-line assessment

Applications

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• Operating rooms, emergency rooms, intensive care units
• Medical procedures that require constant blood monitoring, such as kidney dialysis and cardiovascular surgery

Additional tech IDs: 30734-30076

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