Non-Invasive Assessment of Venous Pressure via Actuation of Reciprocal Surface Forces for Vessel Collapse Using Single-Crystal Ultrasound in Vertebrates

Technology #19192

Applications

This device for assessing vascular health has potential clinical applications in monitoring edema as seen in heart disease, detecting dehydration, and assisting with finding thromboembolisms or other vascular pathologies. It is portable, low-cost, and non-invasive, making it suitable for use in human hospitals, urgent care settings, outpatient clinics, and veterinary medicine.

Problem Addressed

Intravascular volume (IVV), the fluid within the circulatory system, is a clinically-significant indicator of both vascular and tissue health. An imbalance in IVV can be indicative of health disorders such as edema, acute fluid loss from diarrhea, or hypertension. Central venous pressure (CVP), the pressure of blood in the thoracic vena cava, is the clinical gold standard measurement of IVV, and right heart catheterization is the typical measurement technique. Unfortunately, this technique is invasive, and it requires expensive equipment and training. Clinicians also use external jugular venous pressure assessment to estimate CVP; however, this method is subjective and highly user-dependent. There is a need for a device, such as this, that is capable of reliably and non-invasively measuring CVP in order to elucidate a patient’s IVV status and guide clinical therapeutic paradigms.

Technology

This is a medical device to non-invasively assess a patient’s CVP via venous pressure, as a means of monitoring IVV. The device utilizes a single-crystal transducer to transmit ultrasound pulses through the patient’s tissue to the walls of the target vein. It then records the reflected ultrasound pulses to measure the dimensions of the target vein while minimizing signal noise. This device also utilizes a sensitive load cell to accurately measure the force it takes to collapse the target vein while accounting for the compression of skin tissue. Finally, the device combines these measurements to accurately calculate and quickly display the patient’s CVP.

Advantages

- Non-invasive
- Small, portable, and low-cost
- Ability to measure very low venous pressures
- Ability to be used on any accessible vein, including the internal jugular vein
- Possibility to create a wearable form of this device for continuous monitoring of venous pressure
Categories For This Invention:

Medical Devices
Other (Medical Devices)
Life Sciences
Clinical Applications
Blood Disorder
Cardiovascular
Diagnostics

Intellectual Property:

Non-invasive assessment of anatomic vessels
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