

TECHNOLOGY OFFER

Blood pressure simulator for laboratory / OR-applications, implant testing and training purposes.

With the blood pressure simulator (BPS), a pump was created, which allows to mimic the exact arterial pressure waveform of a heartbeat inside a laboratory/OR environment or testing facilities. The BPS can simulate every possible physiological and pathological scenario occurring inside human or animal blood vessels in vitro. The BPS opens new possibilities in optimizing extracorporeal techniques (ECMO, ECLS), testing vascular implants (VADs, AHVs, TAVIs, stents, and delivery systems), in creating realistic settings inside laboratories (cell biology, tissue engineering, and biomechanics), and in supporting physicians to acquire new implantation techniques.

BACKGROUND

If a blood vessel gets pressurized, its lumen increases. This non-linear relation is called compliance. Most commercial pumps try to simulate this effect with so-called passive compliance chambers (PCC). Inside these PCC, elastic membranes made of polymers expand if the pressure increases. Thus, the values of the systolic and diastolic blood pressure can be adjusted; however, not the shape of the blood pressure waveform. The pressure waveform still depends on the material response of the polymer membranes. Nevertheless, for highly sensitive applications on the patient or for research projects, exact waveforms have to be mimicked.

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While the BPS provides a realistic pulsatile volume flow, a fully active compliance chamber (ACC) regulates the resulting pressure 30-times per heartbeat. If the blood pressure differs from the user defined pressure waveform, the ACC rapidly alters the volume inside the system with a servo-driven mechanism. An interface enables the user to define and change the function of the blood pressure waveform and heartbeat in real-time. Furthermore, different blood pressure modes (e.g. resting heart rate, exercise, cardiac defect) can be saved and used on demand.

ADVANTAGES

- Exact simulation of various pathological and physiological blood pressure scenarios in vitro.
- Versatility and accuracy for various optimizations, testing and training procedures.
- Potentiality to minimize/substitute animal trials.

KEYWORDS:

Mechanical circulatory support,
Cardiovascular simulator,
Ventricular physiology,
Mock circulatory loop.

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COOPERATION OPTIONS:

LICENSING
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