**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*. Therefore, 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.

**TECHNOLOGY**

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 to change the function of the blood pressure waveform and the heartbeat in real-time. Furthermore, different blood pressure modes, e.g. *resting heart rate, exercise, and 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 extensive and ethically questionable animal trials.

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**KEYWORDS:**

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

**INVENTORS:**

AGRAFIOTIS, GEITH, HERGESELL, HOLZAPFEL, SOMMER, SPILOPOULOS

**COOPERATION OPTIONS:**

LICENSING RESEARCH COOPERATION

**DEVELOPMENT STATUS:**

PROTOTYPE

**STATUS OF PATENTS:**

EUROPEAN PATENT APPLICATION PENDING EP 19 179 022.9

**CONTACT:**

Dr. Heidi Schmitt
Medical University of Graz
Technology Transfer Office
Auenbruggerplatz 2.
A-8036-Graz
T: +43 -316-385-72018
heidi.schmitt@medunigraz.at
www.medunigraz.at

![Diagram of the blood pressure simulator](image-url)