



CASE STUDY

Revolutionizing blood pressure understanding

A case study on the power of combining longitudinal BP data from a novel BP wearable sensor with real world clinical data

IN COLLABORATION WITH

Private Universität im Fürstentum Liechtenstein · McMaster University · GAPP Studie

CHALLENGE

24/7 patient tracking and uncover data patterns

Although many determinants of hypertension and cardiovascular risk are well established, the factors driving their early development and progression remain incompletely understood, particularly in young, otherwise healthy adults. Despite being in their 20s or 30s, long-term studies demonstrate that having high blood pressure substantially raises the risk of these individuals developing major health problems later in life.

In 2010, Professors David Conen at McMaster University and Lorenz Risch at the Private University of Liechtenstein initiated the GAPP study. This large,

prospective cohort study aims to follow over 2,000 participants for several decades. The goal is to uncover longitudinal associations of blood pressure patterns with genetic, biomarker, and healthcare data. This data may provide new insights into the determinants and progression of hypertension and other cardiovascular risk factors. The University of Liechtenstein sought a collaboration to help determine phenotypic and genetic factors related to blood pressure and cardiovascular disease in the Principality of Liechtenstein.

SOLUTION

Validated technology to collect longitudinal blood pressure data

The University of Liechtenstein chose Hilo's innovative 24/7 blood pressure technology to play a key role in its ongoing research and groundbreaking study. Hilo's clinically validated device passively collects longitudinal blood pressure data, making Hilo the ideal partner for the university's collaboration to gain a deep understanding of the phenotypic and genetic factors related to cardiovascular health.

As a pioneer in cuffless technology, Hilo will provide valuable insights and data to the GAPP study with little added burden on participants. By utilizing their innovative technology, Hilo captures an average of 27 blood pressure readings per participant daily. This extensive dataset enables substantially richer analysis of blood pressure patterns during the study, enabling more detailed investigation of associations between blood pressure patterns and health outcomes.

The Genetic and Phenotypic Determinants of Blood Pressure (GAPP) study is an ongoing, prospective investigation of the genetic and phenotypic factors that influence blood pressure and other

cardiovascular disease risk factors. The study cohort consists of a general population sample of initially healthy adults aged 25–41 years at study entry and living in Liechtenstein. Participants were excluded if they have existing cardiovascular disease, diabetes, sleep apnea, daily NSAID use, or severe obesity (BMI over 35 kg/m²). Comprehensive medical, lifestyle, and nutritional assessments are completed for each participant on a regular basis. Standardized measurements are taken for weight, height, waist circumference, clinic and 24-hour ambulatory blood pressure, 12-lead and 24-hour Holter ECG, bioimpedance analysis, blood and urine sampling, spirometry, and sleep pulse oximetry with nasal flow. These comprehensive health examinations occurred at baseline, with follow-up exams occurring every 3–5 years. Hilo's technology will now provide continual blood pressure data, enabling more robust data analysis than previously possible.

This ability to collect substantially more longitudinal blood pressure data holds immense promise for gaining new insights into the phenotypic determinants of cardiovascular disease risk and improving risk prediction models.

Impact from the collaboration

With 100 Hilo devices deployed in the study since Autumn 2023, each collecting an average of 27 measurements per day, the researchers have and will continue to benefit from over 6,000 BP data points per day.

This volume of BP measurements is unprecedented when compared with cuff-based BP modalities, and by leveraging the power of modern data science,

Machine Learning & Artificial Intelligence, the collaboration is expected to advance understanding of cardiovascular health in the study population, while enabling the identification of novel associations between blood pressure patterns and health outcomes.

2000

Patients

27

BP readings daily

24/7

patient monitoring

Reducing future cardiovascular risk in young and healthy people

The GAPP study offers an exceptional opportunity to assess genetic and phenotypic markers associated with the development and progression of cardiovascular risk factors and track their progression over time in a young, healthy general population sample. The GAPP study investigators aim to explore the added value of Hilo's 24/7 blood pressure monitoring technology for identifying cardiovascular risk factors and enhancing risk prediction. This continuous blood pressure data collection holds great promise for advancing blood pressure research. In the long term, this collaboration seeks to uncover new

signals for improving understanding of blood pressure regulation and its long-term clinical implications.. By leveraging the robust GAPP study database and Hilo's innovative technology, we can enable more personalized, proactive, patient-centered healthcare, and gain a deeper understanding of the role blood pressure plays across a range of health outcomes. By drawing on the extensive GAPP study database and Hilo's innovative technology, the goal is to pave the way for more personalized, proactive, and patient-driven healthcare.

hilo

Hilo's partnerships with renowned institutions and experts highlight the demand for adopting novel technologies in scientific research. As a pioneer in blood pressure technology, Hilo continues to strengthen its position through these key collaborations.

If you would like to consider adding Hilo to your research programs, [contact professional@hilo.com](mailto:contact_professional@hilo.com)

“We are excited to be able to expand our activities to next level research to better understand blood pressure variations using long term recordings.”

PROFESSOR LORENZ RISCH

“Combining population research with cutting edge technology has a great potential to improve health in the society.”

PROFESSOR DAVID CONEN