Suomen rokotetutkimus
Finnish Vaccine Research

Vaccine clinical trial environment; history, current and future

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FVR – Finnish Vaccine Research

Declaration of conflict of interest

AAP is currently employed by FVR – Finnish Vaccine Research, which conducts vaccine research funded by a number of vaccine manufacturers including Pfizer, Inc., Moderna, Sanofi, GlaxoSmithKline SA, MSD, and Seqirus.

AAP has participated in advisory boards for MSD, Pfizer Inc., Janssen, Bionet, GlaxoSmithKline SA, and Vactech, but has received no personal remuneration.

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FVR in brief

Special-assignment company of the Finnish state:
commercial vaccine research and related expertise for the needs of society, public authorities, and vaccine manufacturers.

Ownership

Finnish government 51%
Tampere University Foundation 49%

Established in 2022;
builds on the solid foundation of decades-long vaccine research of

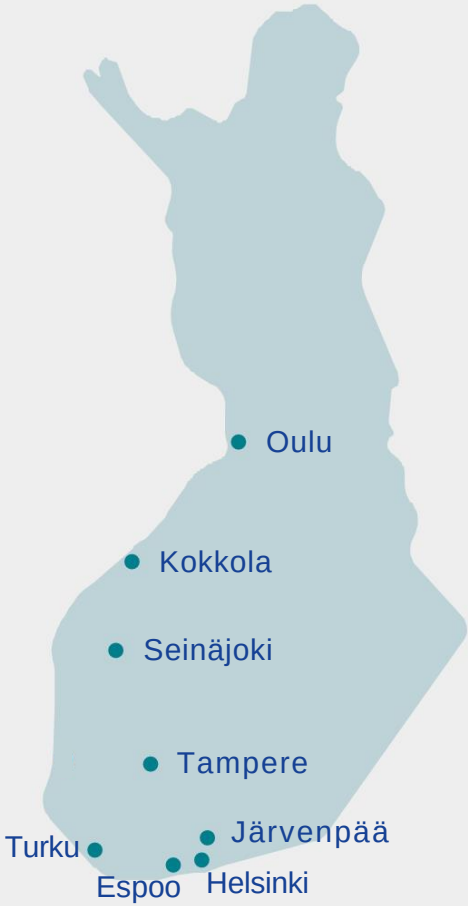
- the Tampere University's Vaccine Research Center and
- the Finnish Institute for Health and Welfare's (THL) commercial vaccine research.

Network of clinics and RWE studies

Extensive national network of vaccine trial clinics and RWE expertise.

Research (in 2023)

26 trials in various stages, against 11 different pathogens
Thousands of new volunteers enrolled for vaccine trials each year



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Finland has 70 years of history with clinical vaccine trials!

Finland participated in the Salk polio vaccine trial in 1954, which used for the first time the now-standard double-blind method.

20 years later, meningitis epidemic caused by sulphonamide-resistant group A meningococci in Finland was stopped by randomized vaccine trials conducted in the Finnish Army and young children.

Subsequently, numerous randomized field vaccine trials on polysaccharide and conjugate vaccines against Haemophilus influenzae type b and pneumococcus have been conducted at the Finnish Institute for Health and Welfare (THL) and its predecessors (KTL).

Tampere University Vaccine Research Center (RTK) was established in the 1990ies to conduct phase 1 to phase 3 clinical vaccine trials, especially on pediatric rota vaccines.

FVR is continuing the work of THL and RTK in conducting phase 1 to phase 4 clinical vaccine trials.

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Current domestic vaccine development

- National vaccine antigen development sparse
  - **Vactech**
    - developing a vaccine for the prevention of Type 1 with phase 1 results published (Hyöty H et al 2024)
  - **Rokotelaboratories Finland**
    - Aims to start phase 1 nasal COVID-19 vaccine late 2024
  - **Finvector**
    - GMP manufacturer of viral-based products
  - **Biovian** is a Bio-CDMO that provides services to biotech companies developing innovative gene therapies or biopharmaceuticals.

- No commercial vaccine production facilities in Finland at the moment

- Thus, clinical vaccine trials dependent on global sponsors

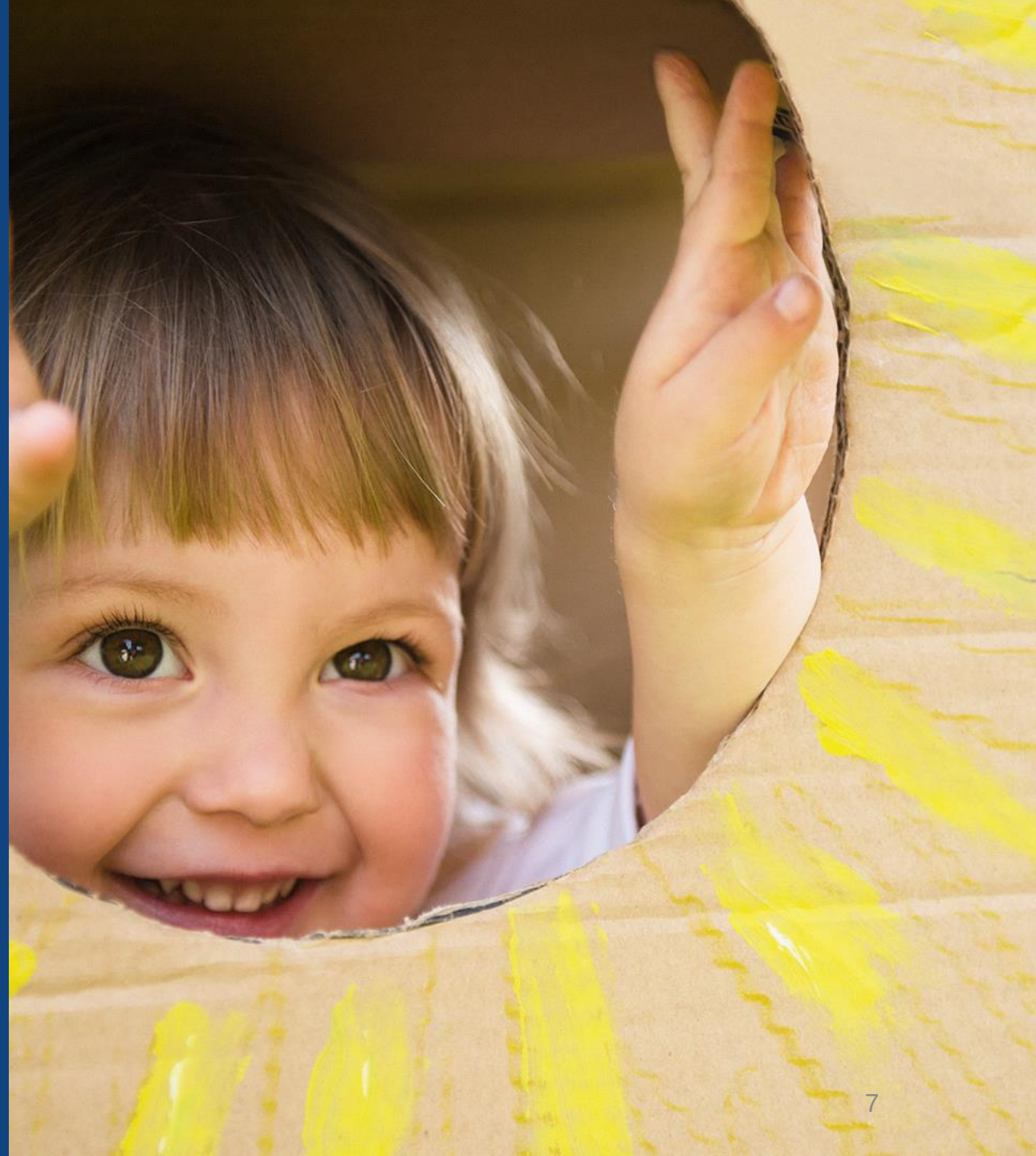
WHY FINLAND

for pharmaceutical R&D?

Pharma Industry Finland (PIF)

Land of High-Quality Vaccine Research

National network, broad experience



Vaccine Studies

- Clinical site networks are located across Finland enabling large population-based enrollment of study subjects
  - Finnish Vaccine Research (FVR)
  - Meilahti Vaccine Research Center (Mevac)
  - Terveystalo
- Despite being a small nation, it is possible to quickly recruit a large number of subjects
- During 2019-2023, over 130,000 trial subjects in vaccine studies
- Large variety of indications
  - Rotavirus, Pneumococcal, Meningococcal ABCWY, Herpes Zoster, RSV, Influenza, COVID, HPV, CMV, C-diff, Lyme disease, Dengue
- Populations from pregnant women to newborns and elderly people
- Highly experienced in clinical vaccine studies in all phases (I, II, III, IV)

FVR:

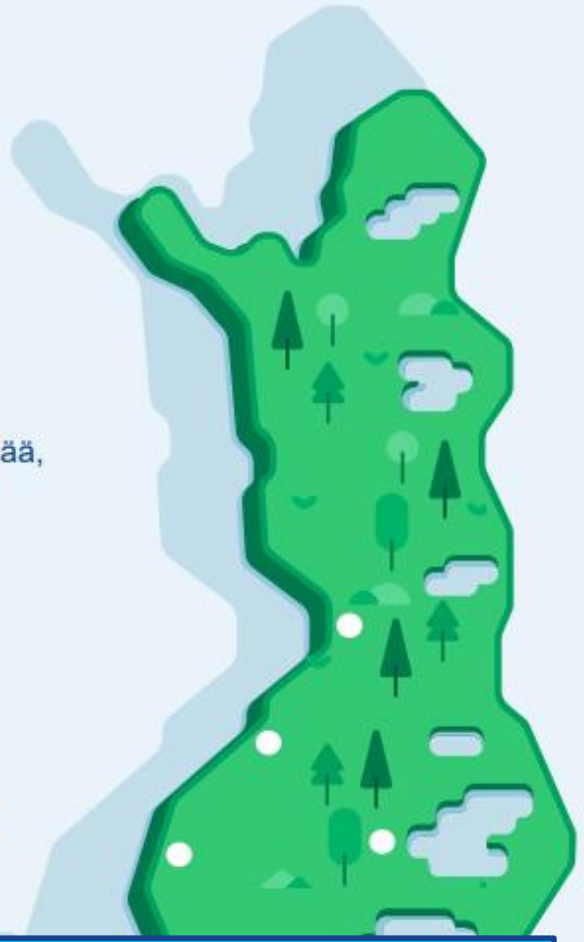
Helsinki, Turku, Tampere, Oulu, Kokkola, Järvenpää, Espoo, Seinäjoki

Mevac:

Helsinki

Terveystalo:

Oulu, Jyväskylä, Tampere, Turku, Helsinki

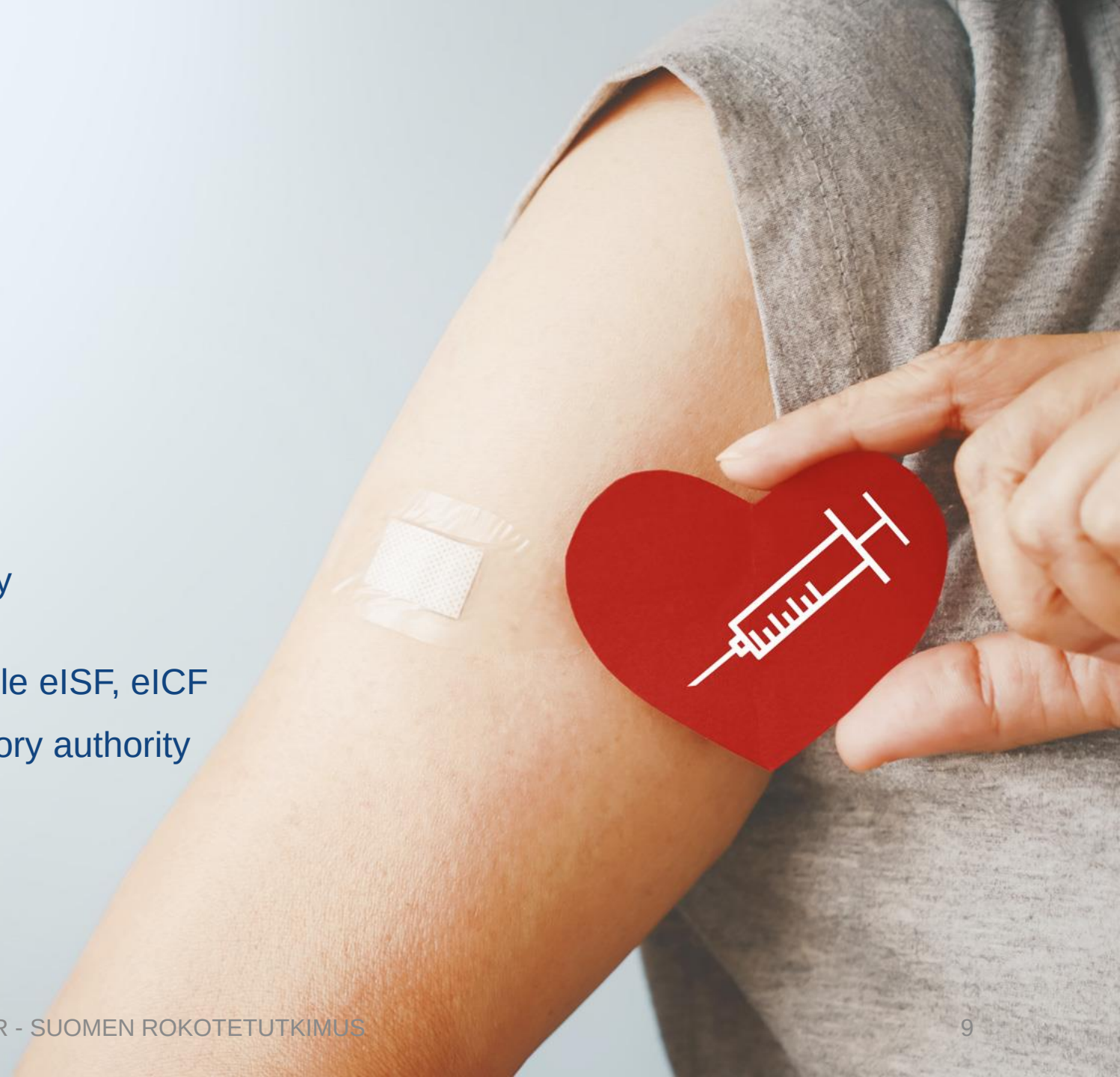


25 active vaccine trials in Finland at Clinicaltrial.gov
18 of those conducted at FVR (72%)

Sponsors including GlaxoSmithKline SA, Sanofi,
Moderna, Pfizer Inc., MSD, and Seqirus

Vaccine Studies – Opportunities

- Low drop-out rate, high retention rate
- Recruitment reliability is high
- GCP-trained staff, dedicated to CT only (FVR & Mevac)
- Innovations and technology, for example eISF, eICF
- Fast start of the study after the regulatory authority approvals
- Fluent and fast contract negotiations



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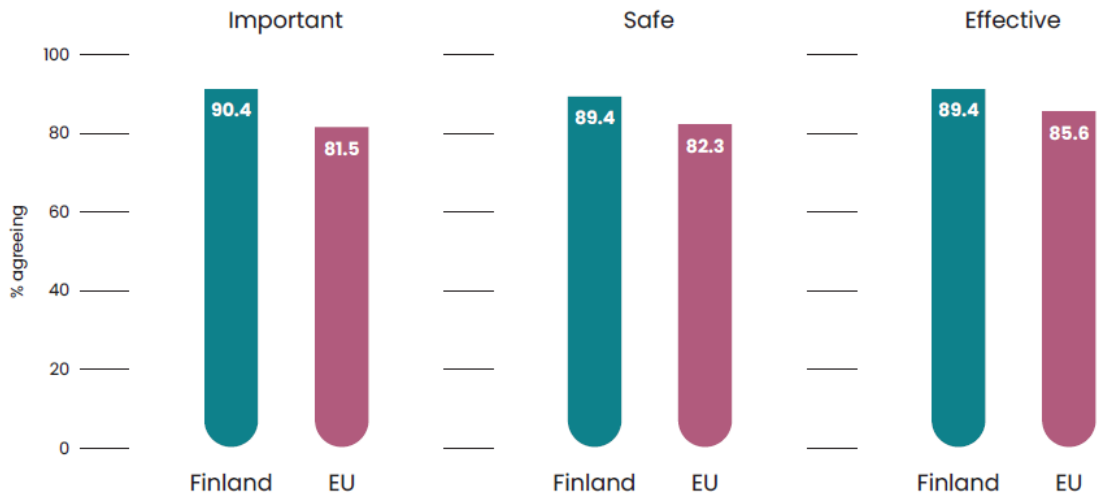
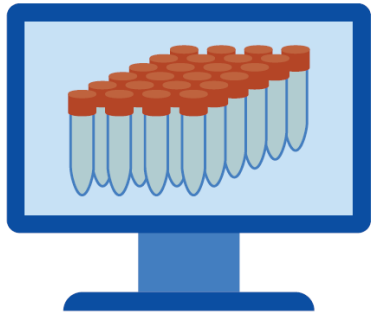
Favorable population attitudes and regulatory environment



Vaccine confidence among Finns is high
(source: European Commission, 2022:
"I believe vaccines are...")

Population 5.6 million
All residents have a personal identity code (PIC) for linking individual-level health data



Unique data from biobanks
Finland has an internationally unique Biobank Act that makes collections of hospitals and research institutes available for all researchers

Secondary use of health data
Finland is the first European country to set up a specific legal act on the secondary use of health and social data in 2019 (applies to register-based research)

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Real-world evidence studies on vaccinations

- vaccination coverage
- vaccine effectiveness/impact
- safety
- disease burden and resource use of vaccine-prevantable diseases
- cost-effectiveness of vaccinations

- THL
- FVR, Oriola, NHG, etc.

Digital Health, Social and Welfare Registers

17

comprehensive & high-quality registers

THL = Finnish Institute of Health and Welfare **KELA** = Social Insurance Institution **STAT** = Statistics Finland **DVV** = Digital and Population Data Services Agency
ETK = Finnish Centre for Pensions **FIOH** = Finnish Institute of Occupational Health **FIMEA** = National Agency for Medicine

Well-functioning healthcare system

Electronic patient records

Digitally skilled & engaged people & culture of trust

Genomic data & biobanks

Government backing

Exceptional Finnish data availability

- The National Vaccination Register (NVR)
- National Infectious Diseases Register (NIDR)
- The Care Register for Health Care (Hilmo)
- The Register of Primary Health Care Visits (Avohilmo)
- The Medical Birth Register (MBR)
- The Digital and Population Data Services Agency (DVV)

Data are nationwide, complete, real-time, linkable, affordable

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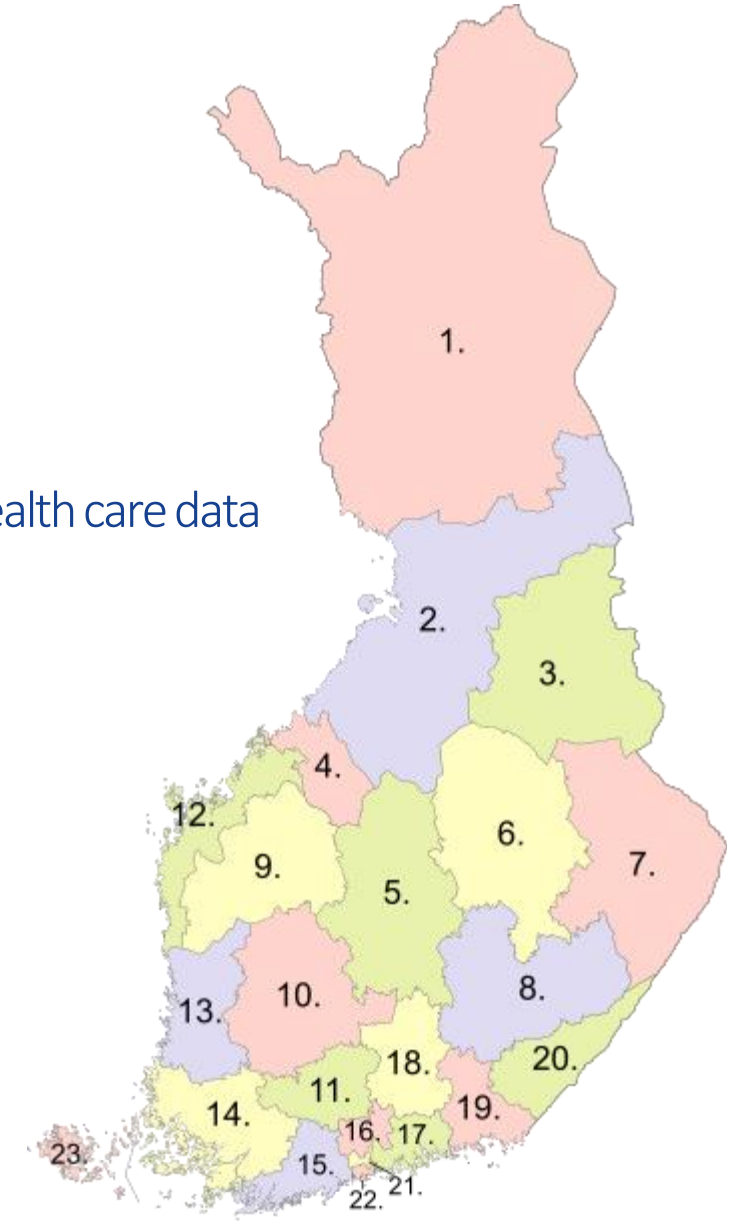
Additional features to augment research

National Electronic Patient Data Repository (KANTA)

- The Kanta Services are a set of digital services that store citizens' social welfare and health care data
  - Hospital and primary care
  - Public and private
    - HCP visits
    - Laboratory data
    - Radiological data
    - Prescriptions
    - Etc.

Highly centralised public health care (wellbeing services counties)

- National health insurance, equal access, low costs, reachable

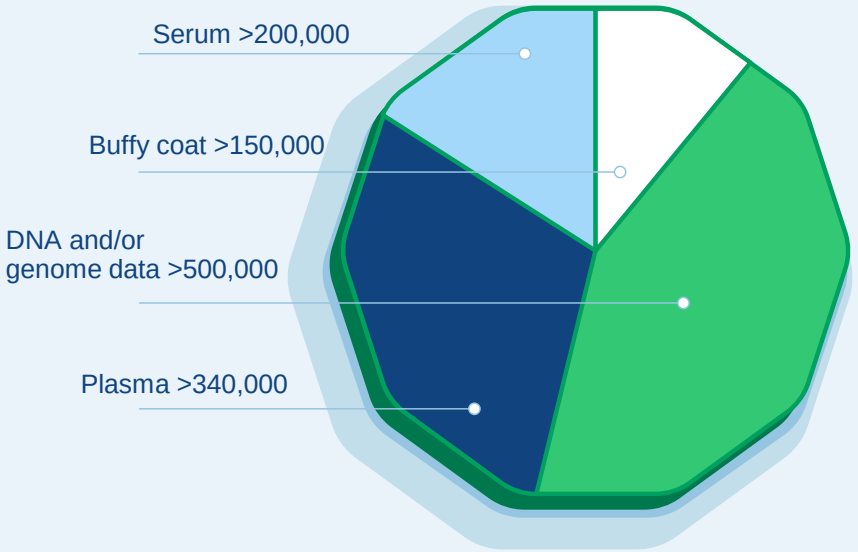


Finnish Biobanks Contain 4 Million Patients With 13 Million Samples*

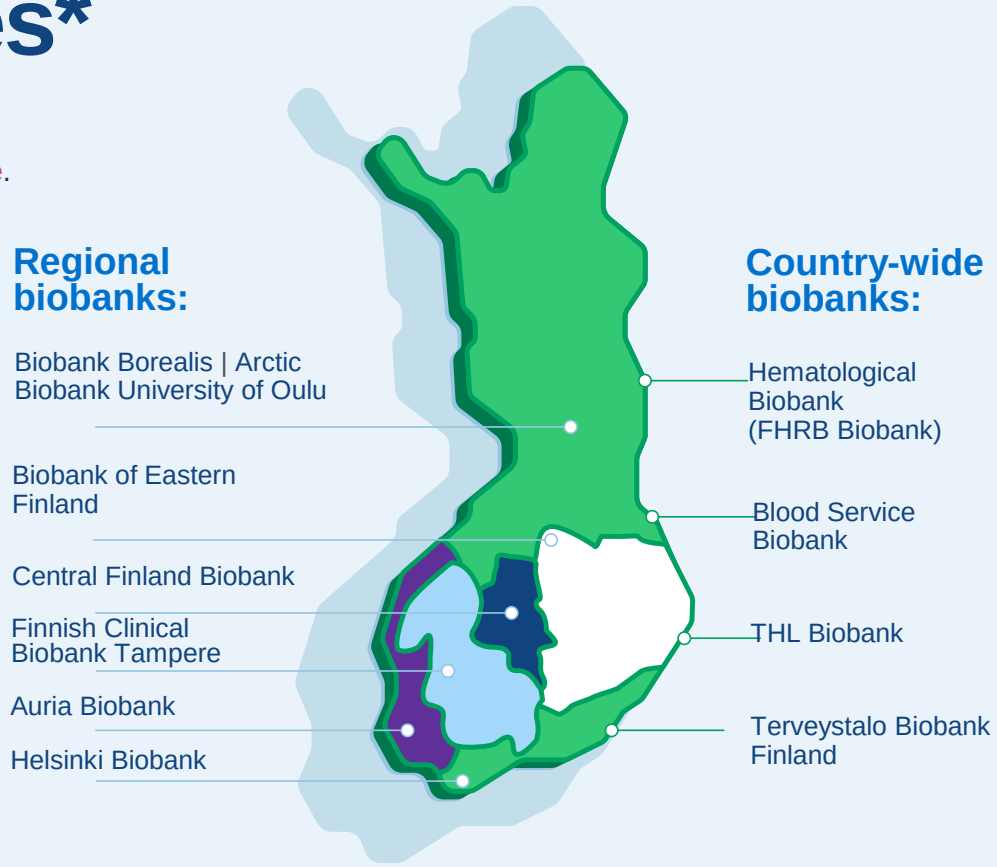
NATIONAL PATIENT RECALL SERVICE

Over 300,000 patients available for recontacting through FINBB's unique **Fingenious® biobank service**.

Examples of samples stored in Finnish biobanks:



>400,000 sample donors with genome data



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*All Finnish biobank operations are regularly supervised by the Finnish Medicines Agency (FIMEA).

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Pragmatic trials: Combine RCT with collection of register-based data

Advantages of the pragmatic trial approach

- superior internal validity compared to observational studies (**lack of confounding**)
- superior external validity (**generalizability**) compared to prelicensure trials
- feasible for **long-term follow-up** and for a **large number of subjects** and different outcomes allowing adequate power
- **register data collection** complete and real-time
  - register data collection is **mandatory**, established through laws
  - **automated** electronic data collection
  - **nationwide**
  - deterministic **data linkage** through personal identity code (PIC) used for capture of the events, cross-linkable between the registers
  - practically **no loss-to-follow up** (except relocation abroad)
- parallel comparison in a randomized design allows use of the **vaccine-probe design**
  - estimation of the undetected disease burden
- design **not dependent on large-scale introduction** in national immunization programmes
- **historical "pilot study"** data can be collected through the registers for planning
- Etc.

Examples of pragmatic vaccine trials

FinIP vaccine trial 2008–2018 in collaboration with GSK

- Pneumococcal conjugate vaccination in infants
- Largest of its kind globally (N=47,000)
- Palmu AA, et al. Lancet 2013, Palmu AA, et al. Lancet Resp Med 2014, Kilpi TM, et al. Vaccine 2018, Palmu AA, et al. Pediatr Inf Dis J 2015, Palmu AA, et al. Lancet Inf Dis 2014, Palmu AA, et al. Vaccine 2018

FinFluHD vaccine trial 2019–2022 in collaboration with Sanofi Pasteur

- Influenza vaccine trial in the elderly
- The biggest vaccine trial of the modern era (N=121,000 planned), 33 000 enrolled in 2019-2020 influenza season
- Study discontinued in April 2022 due to the COVID-19 pandemic
- Palmu AA, et al. High-Dose Quadrivalent Influenza Vaccine for Prevention of Cardiovascular and Respiratory Hospitalizations in Older Adults. Influenza Other Respir Viruses. 2024 Apr;18(4):e13270.
- Tuomo A. Nieminen, et al. Development of real-time surveillance for serious adverse events in a pragmatic clinical trial using national registers in Finland. Clinical Epidemiology, in press.

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Future insights

- New vaccine technologies and new indications provide excellent opportunities for future expansion

- Global competition is getting ever harder
- EU needs to improve its competitiveness in clinical research
  - Regulatory review timelines during the Clinical Trial Regulation era are longer than in US
  - Complex application process with predefined duration of numerous steps
- Low-cost countries emerge as important clinical trial sites globally
- Large global networks have been developed to conduct multicenter trials
- FVR strategy to expand its impact
  - Phase 1 to 3 clinical trials + Pragmatic trials + observational RWE studies

- Adult vaccines are a natural choice:
  - Finnish adult population is adequate, yet the infant birth cohorts are decreasing

- Finland needs to keep on exploiting its national competition factors in clinical research

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Kiitos!

Phases 1-4,

with extensive experience and documented performance

05.12.2024