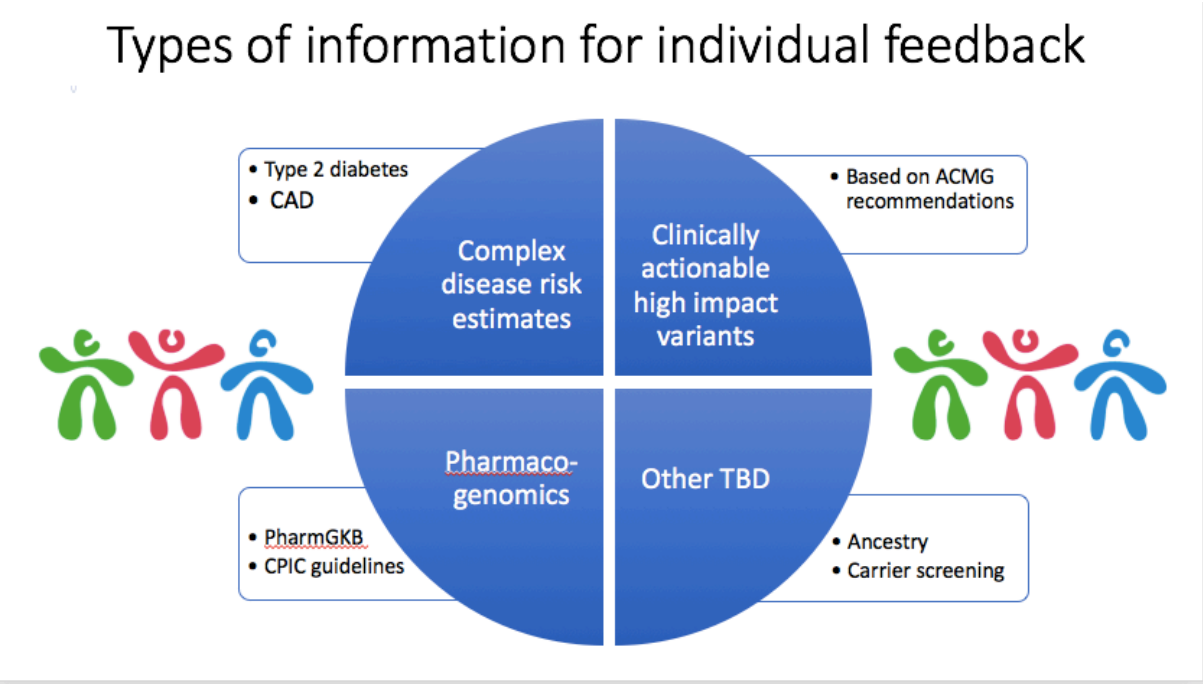
Estonian Biobank to provide personalised feedback to biobank participants

About Estonian Biobank

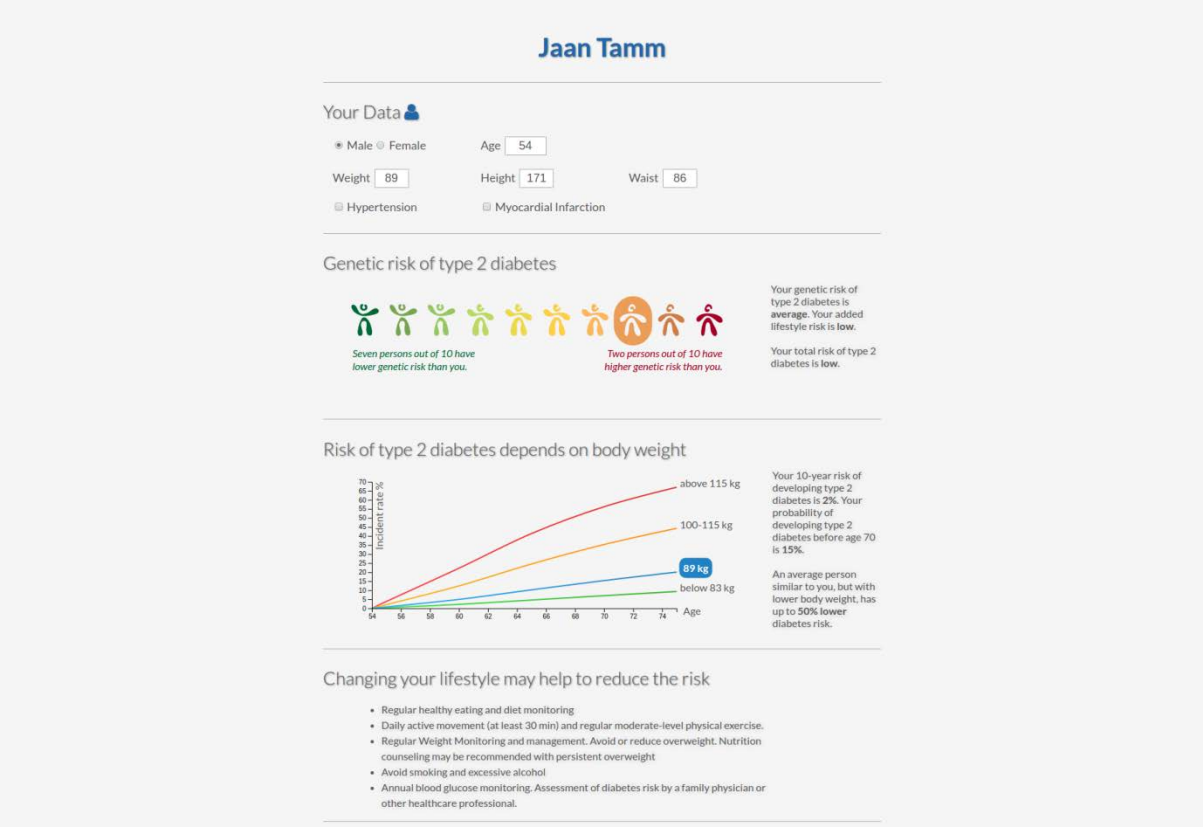
Estonian Biobank (EGCUT) is a population-based longitudinal biobank established in 2000 and representing about 5% of Estonia's adult population (i.e. a total of 52,000 participants). The whole cohort of the EGCUT is now fully genotyped and 2,500 individuals have been whole-genome sequenced. According to Estonian legislation, i.e. the Estonian Human Genes Research Act (HGRA), and the broad informed consent signed by all participants, the Estonian Biobank is authorised to access the e-Health system, national registries and hospital databases in order to continuously update the health information of all participants upon recruitment.

The research data generated at the biobank enable us to use individual genomic variation obtained from genetic analysis and computational methods to predict disease risk, detect high-impact, medically actionable findings etc. Through the return of individual risk information, we aim to inform treatment, optimise drug prescription, and potentially postpone disease onset. Returning individual genomic results to biobank participants started in 2016, using previous projects that involved returning research findings to biobank participants as a model (ref. Leitsalu et al 2016 Per.Med; viide Neeme ESHG ettekandele). Familial hypercholesterolemia was used as a model during this first stage. Within the new pilot programme, feedback will be given to participants who express an interest and fulfil the legal requirements stipulated by the Human Genes Research Act. Once the pilot phase has been concluded, the plan is to embed the report in the medical system in the coming years.

The Estonian National Personalised Medicine Program, which was launched under the leadership of the Ministry of Social Affairs (2015-2018), foresees for genomics to become part of the national healthcare system. This project can accommodate an increase in the number of people participating in the Estonian Biobank in the coming years, with an initial goal of recruiting 100,000 new participants in 2018. Moreover, several hospital-based projects dealing with personalised medicine (CAD and breast cancer) are set to launch later this year. The nationwide system will thus integrate data from Estonia's different healthcare providers with their genetic profile to create a common health record for each patient.



Examples of reports provided to participants



Jaan Tamm

Your Data

Male ○ Female Age 54

Weight 89 Height 171 Waist 86

☐ Hypertension ☐ Myocardial Infarction

Genetic risk of type 2 diabetes

Seven persons out of 10 have lower genetic risk than you.

Two persons out of 10 have higher genetic risk than you.

Your genetic risk of type 2 diabetes is **average**. Your added lifestyle risk is **low**.

Your total risk of type 2 diabetes is **low**.

Risk of type 2 diabetes depends on body weight

Your 10-year risk of developing type 2 diabetes is **2%**. Your probability of developing type 2 diabetes before age 70 is **15%**.

An average person similar to you, but with lower body weight, has up to **50% lower** diabetes risk.

Changing your lifestyle may help to reduce the risk

- Regular healthy eating and diet monitoring
- Daily active movement (at least 30 min) and regular moderate-level physical exercise.
- Regular Weight Monitoring and management. Avoid or reduce overweight. Nutrition counseling may be recommended with persistent overweight
- Avoid smoking and excessive alcohol
- Annual blood glucose monitoring. Assessment of diabetes risk by a family physician or other healthcare professional.

Genotype information for Biobank participants about genetic variation in genes with previously documented impact on drug respone

Peer-reviewed, evidence-based, updatable, and detailed gene/drug clinical practice guidelines

PG KB CPIC

Genotype-derived reccommendations for drug active substances

Pharmacogenetic report for Jaan Tamm

Drugs with listed active substance need to be used with great caution	Drugs with listed active substance need to be used with caution	Drugs with listed active substance can be used as directed
Antidepressants	**Lipid modifying agents, plain**	**Antimetabolites**
Escitalopram	Simvastatiin	Mercaptopurine
Citalopram	**Antithrombotic agents**	Thioguanine
Sertraline	Warfarin	Capecitabine
Antithrombotic agents		Fluorouracil
Clopidogrel		Tegafur
Antimycotics for systemic use		**Immunosuppressants**
Voriconazole		Azathioprine
		Tacrolimus
		Direct acting antivirals
		Atazanavir
		Other respiratory system products
		Ivacaftor

Prescribing decisions for affected drugs

Antidepressants

Gene: **CYP2C19**
Genotype: ***2/*2**
Poor metabolizer **(PM):** greatly reduced metabolism when compared to extensive metabolizers. Higher plasma concentrations may increase the probability of side effects. Consider a 50% reduction of recommended starting dose and titrate to response or select alternative drug not predominantly metabolized by CYP2C19