



Estonian Biobank- from basic research to public health

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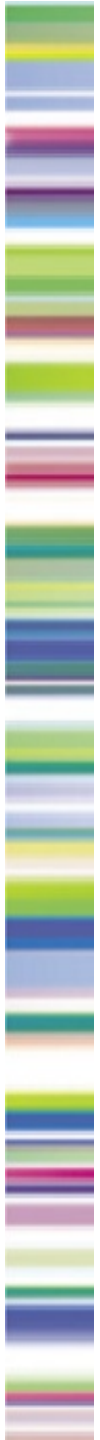


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Estonian Biobank

- Estonian Genome Center, University of Tartu
- A prospective, longitudinal, population-based database with health records and biological materials
- 52,000 participants - 5% of the adult population
- Individuals are recruited by medical personnel
- Broad informed consent
- Legislation: Estonian Human Genes Research Act



Estonian E-services

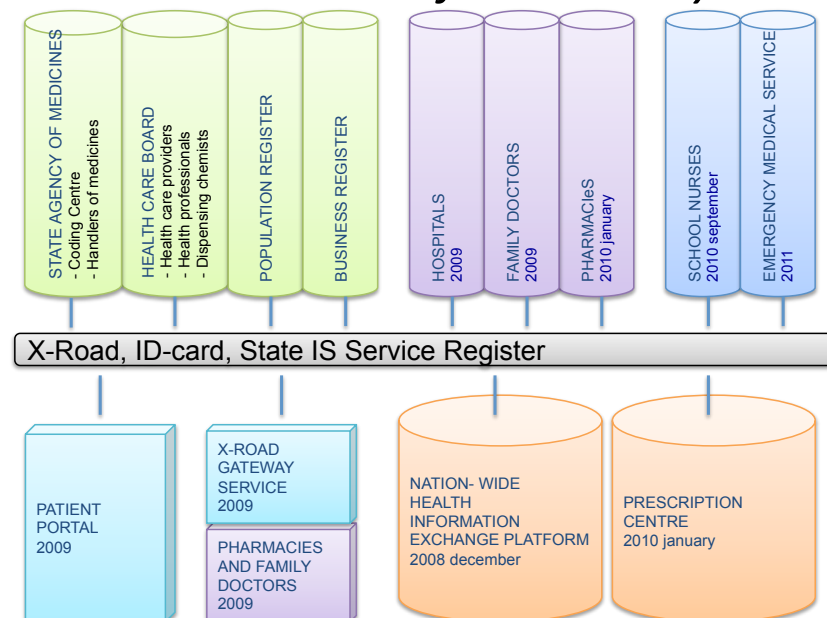
- **Mandatory** ID document for all Estonian residents
- Enables secure digital authentication and signing
- Active cards: **1 209 594** (95% of citizens) [13 Sept 2013]



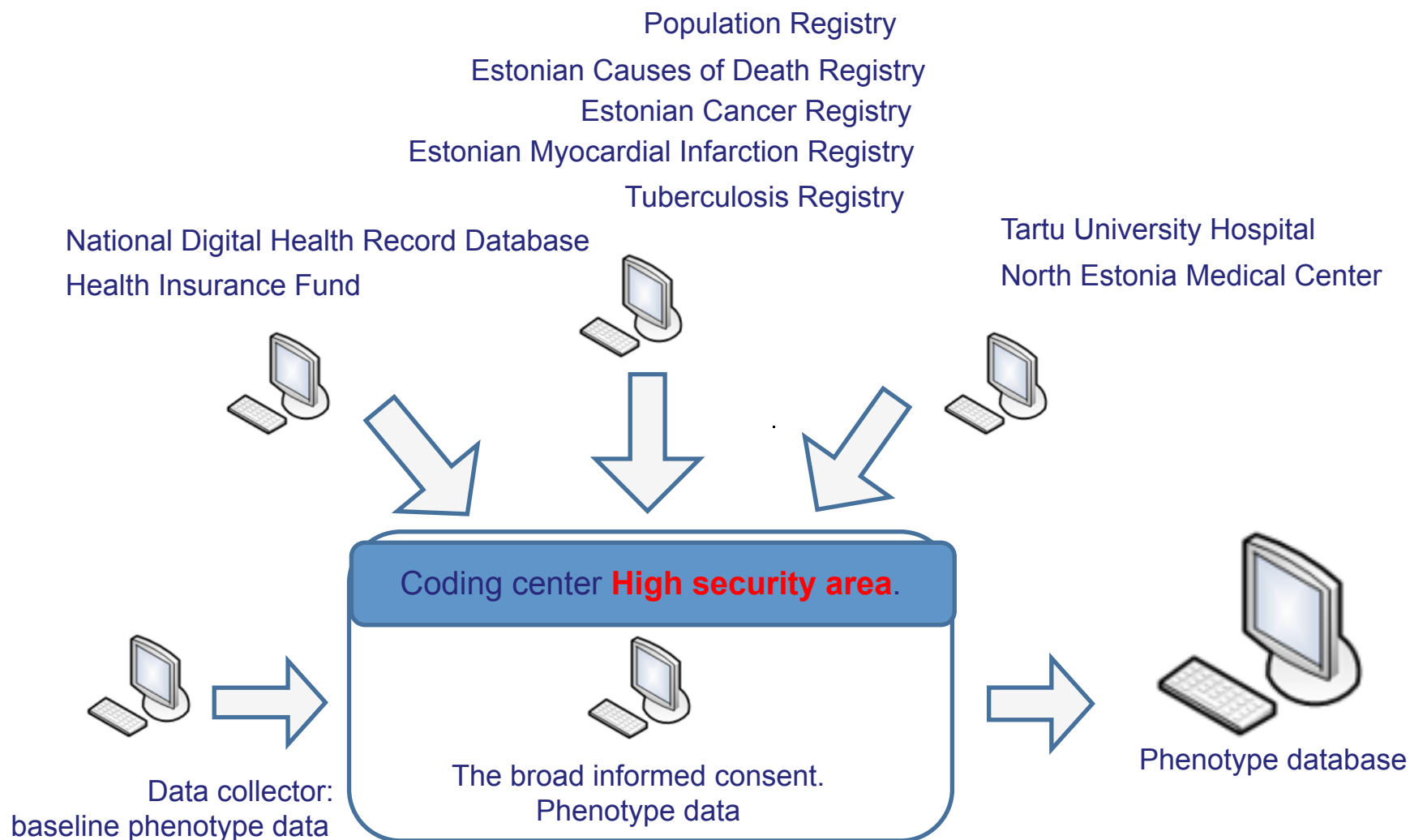
Public e-services

<p>DigiDoc</p> <p>DigiDoc is a system that's widely-used in Estonia for storing, sharing and digitally signing documents.</p>	<p>Digital Signature</p> <p>Digital signature enables secure, legally-binding, electronic document signing online in minutes</p>	<p>e-Business Register</p> <p>Enables entrepreneurs to register their new business online in minutes</p>	<p>e-Cabinet</p> <p>A powerful tool used by the Estonian government to streamline its decision-making process</p>	<p>e-Law</p> <p>Allows public access to every piece of draft law that has been submitted since February 2003</p>
<p>e-Police</p> <p>Revolutionizes police communication and coordination, maximizing effective policing.</p>	<p>e-Prescription</p> <p>A centralized, paperless system for issuing and handling medical prescriptions</p>	<p>e-School</p> <p>Allow students, teachers and parents to collaborate in the learning process</p>	<p>e-Tax</p> <p>e-Tax has drastically reduced the time spent by individuals and entrepreneurs on filing taxes</p>	<p>Electronic Health Record</p> <p>Integrates data from healthcare providers into a national record for each patient</p>
<p>Electronic ID Card</p> <p>e-ID acts as definitive proof of ID in secure electronic environments</p>	<p>Electronic Land Register</p> <p>A one-of-a-kind information system for storing real estate and land data</p>	<p>i-Voting</p> <p>i-Voting allows voters to cast their ballots over the internet, from anywhere in the world.</p>	<p>Keyless Signature Infrastructure</p> <p>Estonian digital society ensures the integrity of its systems and data by using the KSI technology.</p>	<p>Location-Based Services</p> <p>A positioning service that detects device location & provides location information</p>

Electronic Health Information System



From questionnaires to the national registries

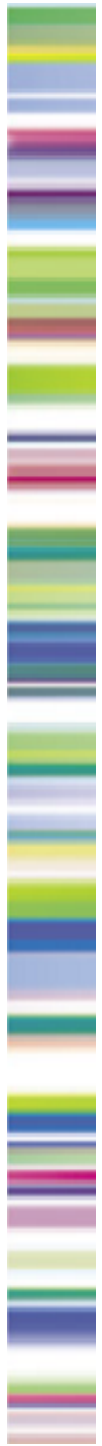
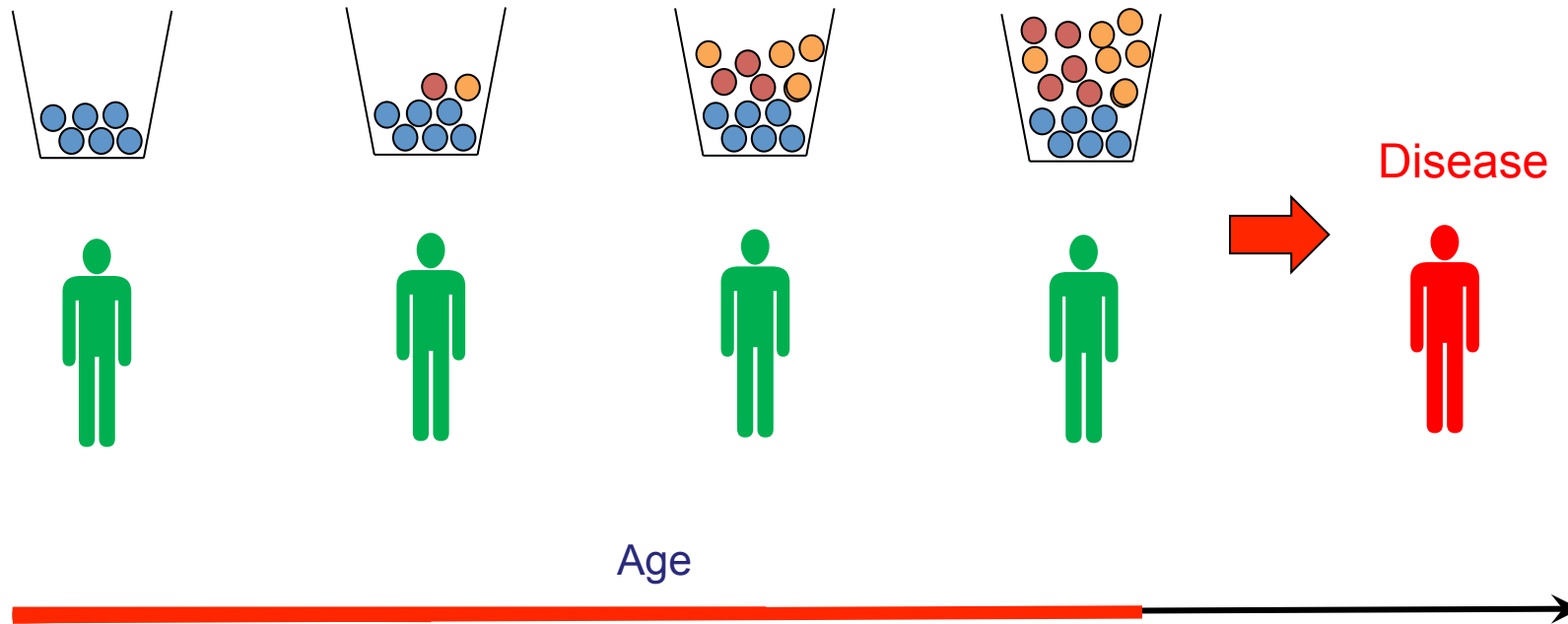


Individual risks

● Genetics

● Age

● Environment, lifestyle, comorbidities



Measures of prevention

Table 2. Primary and Secondary End Point Analyses at 6 Months Follow-up^a

	Mean (95% CI)		Mean Difference (95% CI)	P Value for Difference
Parameter	Intervention (n = 352)	Control (n = 358)		
Primary end point				
LDL-C, mg/dL	79 (76 to 82)	84 (81 to 87)	-5 (-9 to 0)	.04
Secondary end points				
Blood pressure, mm Hg				
Systolic	128 (127 to 130)	136 (134 to 137)	-8 (-10 to -5)	<.001
Diastolic	81 (80 to 82)	84 (83 to 85)	-3 (-4 to -2)	<.001
Heart rate, /min	67 (66 to 68)	69 (68 to 70)	-2 (-3 to -0.4)	.01
BMI	29.0 (28.8 to 29.3)	30.3 (30.1 to 30.5)	-1.3 (-1.6 to -0.9)	<.001
Waist circumference, cm	100.6 (99.5 to 101.7)	105.0 (103.9 to 106.1)	-4.4 (-6.0 to -2.8)	<.001
Hip circumference, cm	101.7 (100.5 to 102.9)	106.4 (105.2 to 107.5)	-4.7 (-6.3 to -3.0)	<.001
Cholesterol, mg/dL				
Total	150 (146 to 154)	159 (156 to 163)	-9 (-15 to -4)	<.001
HDL-C	43 (42 to 44)	44 (43 to 45)	-0.4 (-2 to 1)	.55
Triglycerides	140 (132 to 148)	160 (151 to 168)	-20 (-31 to -8)	.001
Total physical activity (MET min/wk)	936.1 (799.7 to 1072.5)	642.7 (509.2 to 776.2)	293.4 (102.0 to 484.8)	.003
Inactive (<600 MET min/wk), No. (%)	126/338 (37.4)	241/351 (68.8)	0.55 (0.47 to 0.64) ^b	<.001
Current smoking, No. (%)	88/339 (26.0)	152/354 (42.9)	0.61 (0.48 to 0.76) ^b	<.001



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The Estonian Program for Personal Medicine

- Health care

- Educating health care professionals
- Educating patients
- Further development of eHealth incl. decision support systems

- Research and Development

- Sequencing 5000 individuals, genotyping array and analysis software
- International collaboration

- Commercialization

- IP
- Business agreements



Beyond evidence-based medicine

Personalised medicine – general process

