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BIOBANKING FOR GLOBAL CHALLENGES

Biobank and lifestyle data provide opportunities to study development and progression of type 2 diabetes

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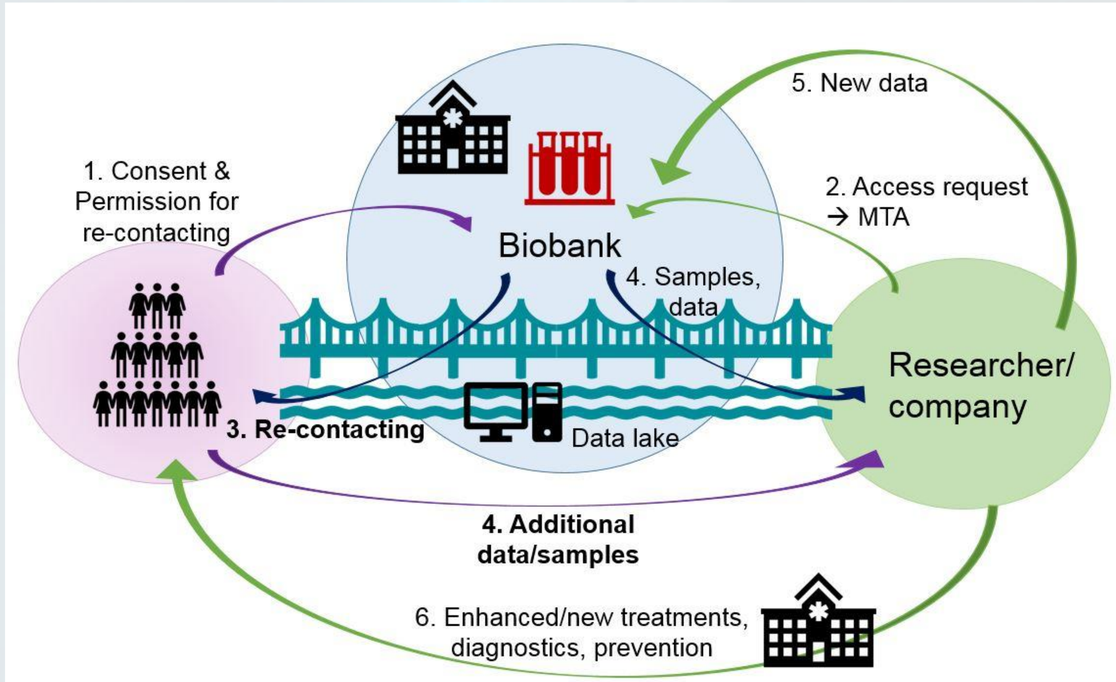
INTRODUCTION

Type 2 diabetes is globally a major non-communicable disease affected by unfavorable lifestyle together with polygenic risk factors [1-3]. Type 2 diabetes can be prevented by comprehensive lifestyle changes [4-7]. However, the individuals at increased risk should be reached earlier [6]. Due to the complexity and heterogeneity of the disease, more targeted and personalized interventions are also needed. Biobanks operate as a part of the health ecosystems, building bridges between patients, researchers and routine health care. The common purpose of Finnish biobanks is to collect, administrate, preserve and improve the quality of biological human samples and related clinical health data for medical research and development.

AIM

- Create and pilot a new **model to collect** and integrate **lifestyle data digitally** into the clinical patient register data at Biobank of Eastern Finland (BBEF)
- Recognize known biomolecular, physiological and lifestyle **factors associated with T2D** in the combined biobank and lifestyle data
- Provide information about the **development and progression of T2D** and the **usability of** clinical **biobank data** in biomedical research



Biobank research including re-contacting of biobank donors.
Along with clinical patients register data and specimens, biobanks provide possibility to collect additional data and samples based on the permission given in the biobank consent. This enables collection and usage of more extensive information on well-being. The Finnish Biobank Cooperative (FINBB) is a one-stop gateway to the Finnish biobank network. FINBB provides academic researchers and commercial organizations with access to biobank materials and data. MTA=Material Transfer Agreement

RESULTS

Information retrieval from the biobank database, re-contacting of BBEF participants and the electronic lifestyle questionnaire technically succeeded

The clinical biobank data contained laboratory measurements (n=30,261) over the last 13 years, and BMI (n=1,343) and blood pressure (n=6,265) measurements over the last 9 years, 80-90 % of those from the last 3-5 years.

The participation activity in the lifestyle questionnaire was low (11 %).

Several biomolecular and **some lifestyle-related risk factors,** like unfavorable quality of dietary fats and low consumption of fruits and vegetables, were **recognized**.

Obesity emerged as the main disease-related factor in both T2D and gestational diabetes (GDM) patients. On average, over **80 %** of patients were **overweight or obese** (BMI >25 kg/m^2)

Predictive changes in HbA1c, and fasting plasma glucose and HDL cholesterol concentrations were seen in GDM patients after 6 years from the pregnancy indicating the **development of prediabetes and T2D**.

METHOD

- The initial **study population** covered all individuals with T2D (ICD10:E11) or/and diabetes in pregnancy (ICD10:O24) who had a valid biobank consent and permission for re-contacting (n=540).
- 497 individuals were contacted by letters for the **electronic lifestyle questionnaire**
  18 questions about nutrition
  13 questions about physical activity and
  3-4 questions about smoking depending on the smoking habit
- Previously developed and validated semi-quantitative lifestyle questionnaire [9-10] was used as a model
- **Clinical health data** related to the diagnostics and treatment of T2D and GDM, and the background information about age, sex and diabetes medication were received from Biobank of Eastern Finland
- **Data analysis,** suitable statistical methods
  - Microsoft Office Excel 2016, VBA-tool (pre-processing)
  - IBM SPSS Statistics for Windows (v. 25.0, IBM Corp., Armonk, NY)
  - Python (3.7.5)

CONCLUSIONS

- **Biobank data**, complemented with lifestyle data, are **valuable in biomedical research** concerning biomolecular background and progression of complex diseases.
- More effective ways to collect lifestyle data are needed.
- Biobanks have **real-life data** of an increasing variety of diseases and **individual timelines** of **clinical measurements and incidents**. Biobanks also have collections of various **biological samples** and **genome** information.
- The **possibility to re-contact** individuals for further studies enables collecting and using even more extensive information on well-being. This pilot study showed also how additional e-questionnaires can easily and safely be used on adding health-related data to existing BBEF data.
- Further studies are needed to evaluate the suitability of biobank blood samples for utilization indifferent omics-analyses and detection of early biomarkers that are not available in the clinical data.

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