The Swedish Twin Registry - STR

HISTORY

• Started by Lars Friberg and Rune Cederlöf in the late 1950s
• Church records of twin births 1886-1925
• All identified same sex twins contacted during the 1960s
• Today: all alive Swedish born twins aged 10 or more have been contacted and invited to participate
STR leadership organization

• STR steering group:
  – Patrik Magnusson (director)
  – Nancy Pedersen
  – Paul Lichtenstein
  – Martin Schalling
  – Catarina Almqvist
  – Maria Feychting
  – Johan Askling
  – Sofia Carlsson
  – Magnus Johannesson (representative from the National Council)

• National council:
  Representatives from:
  – Lund University
  – Göteborg University
  – Örebro University
  – Jönköping University
  – Linköping University
  – Umeå University
  – Handelshögskolan Stockholm
Funding

• Run as a KI core facility
• Economic support from the Swedish Research Council 2018-2022
Current invitation/recruitment into STR

- Since 2004 we contact parents to Swedish born twins when the twins turn 9 years of age
- Invitation to participate in STR – broad consent
- Screen for somatic and mental health problem
- High participation rate (70%)
- Follow-ups at 15, 18 and 24 years
Recent landmarks

• *All* adult Swedish born twins have now been contacted for participation when 10 years or older with general questionnaire and DNA donation request

• 200 000 in the register
• 160 000 have zygosity

• The largest twin register in the world
Data

• Paper questionnaires
• Telephone interviews (SALT 1998-2002)
• Web questionnaires (2005 and onwards)
• Health check-ups (TwinGene, CATSS, SATSA)
• Health registers (National Board of Health and Welfare)
• DNA (N=60 000)
• GWAS (N=40 000)
• Serum (N=15 000)
• Blood biochemistry (TwinGene, SATSA)
• Computer tests (cognition, time-consistency)
GWAS (Illumina)

• Older twins, born 1911-1958:
  – N = 20 000

• Twins born 1959-1993 (ongoing)
  – N = 13 300
  – Genotyped in Uppsala (SNP&SEQ Tech) 2018

• Younger cohort, born 1994 and onwards (ongoing)
  – N = 17 000
  – Genotyped in Uppsala (SNP&SEQ Tech) 2015, 2018
Serum measurements

- All of TwinGene (N=12600)
  - HDL, LDL, TC, TG, CRP, Hb, HbA1c, Glucose, ApoA1, ApoB
  - ACPA (Lars Klareskog)
  - Total IgA (Lennart Hammarström)
  - Creatinine, Cystatin C (Per Svensson)
  - Pepsinogen I/II, H.pylori (Weimin Ye)

- Subsets
  - LpPla2, aPC, aOxCl (Ulf de Faire, Johan Frostegård)
  - PCSK9, APOC3 (Ferdiand Van T Hooft)
  - Proteomics (SciLife Lab Protein atlas)
  - Metabolomics (HPLC Mass spec)

Serum is an available but limited resource!
Epigenetics in twins

• Key observations:
  – Gene expression differs between cell types within individuals
  – Discordant MZ twins
  – Gene expression influenced by environment

• Epigenetic measures:
  – DNA methylation, histone acetylation etc.

• Confounding from Genetics:
  – MZ twins may provide remedy!
Apply for new STR projects

• STR steering committee meets 4 times/year
• Short application + CV + ethics permission

Where?
https://ki.se/en/research/swedish-twin-registry-for-researchers

• Metadata + questionnaires accessible for free
• Blood, serum and DNA stored in biobank
• Phenotypes