The Swedish Twin Registry (STR) is a national research register open to academic and industrial users. The mission of the STR is to provide a longitudinal research resource for epidemiological and molecular studies of twins. The STR has contacted all living Swedish born twins (over 9 years) and is the world's largest twin registry with information about 200,000 twins, DNA from 55,000 and serum of 13,000 twins. Genome-wide genotyping is available for more than 30,000 participants.

**Description**

The mission of the Swedish Twin Registry (STR) is to provide a longitudinal research resource for epidemiological and molecular studies of twins. STR is open to applications from Swedish and international researchers. For foreign researchers we require collaboration with a Swedish university. A part of the operating costs for STR is levied through fees for access to the resource according to the practice of KI core facilities.

STR is domiciled at the Karolinska Institutet since 1959. It was originally established to study the importance of the environment for the development of cardiovascular disease and cancer. Since then, interest has expanded to almost all common diseases and health problems. We have contacted all living twins and we are now the world's largest twin registry. A substantial number of scientific articles have been published on data from STR and currently approximately 50 new articles come out each year.
Infrastructure/Methods

Data for the Swedish Twin Registry has been acquired by nationwide questionnaires and telephone interviews conducted for different birth cohorts since the 1960s. These are mainly containing information about self-reported health and different exposures. Additional information about health and disease is obtained through linkages to the Swedish health registries. DNA from 50 000 twins and serum of 12 000 twins are stored at KI Biobank and is subject to use to new investigations and analyses. Genome-wide genotyping (GWAS) of almost 30 000 participants have been completed and genotypes can be used for co-analysis to different outcomes and characteristics. For more detailed information on what data are available for the various cohorts, see www.ki.se/forskning/for-forskare-str.

Study Design

Study designs that are requested and used today include both classical epidemiological studies for the evaluation of risk factors for morbidity and mortality as well as genetic association studies, heritability studies (classic twin design and molecular-based), epigenetics, proteomics and other so-called "omics" hypotheses.

Services

Heritability

By examining how many pairs are concordant / discordant for the disease among identical and fraternal twins the relative importance of genes (heritability) and environmental aspects of various diseases and conditions can be estimated. This can also be done for quantitative measures such as levels of biomarkers in serum. The corresponding estimate of the importance of genetics can also be molecularly accessed using genome-wide genotyping tests.

Reasons for comorbidity

Bi- and multivariate twin analysis can provide information on why certain diseases are related (comorbidity). The question can also be investigated using available genome-wide genotyping tests.

Association within twin pairs
By comparing a relationship observed in the population, whether it also exist within twin pairs, it is possible to examine the extent to which the association is due to genetics, for example, so-called co-twin control designs.

**Discordant monozygotic twins**

Since identical twins share all of their inherited gene pool, hereditary genetic variation cannot explain the differences between monozygotic twins (for example, if one is sick while the other is healthy). Discordant monozygotic twins are therefore informative for effects / mechanisms related to environmental factors such as de novo mutations, epigenetics, levels of metabolites or proteins.

**Practical information**

A steering committee meets four times per year to take decisions for the projects to be implemented. Approval requires a project description that indicates on sound scientific methodology and that twins are not contacted unnecessarily. Access to data and resources further requires an ethical approval from the local ethics review board and that the charges to STR is paid according to the current tariff (see table on the last page).

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