# **GENETIC POLYMORPHISMS AFFECTING HUMAN COGNITION AND THE PHARMACOGENETICS OF PSYCHOACTIVE DRUGS**

September 21 – 25, 2015

## **Course description**

The study of relationships between human genotypes and cognitive phenotypes are in their infancy, but even at this early stage there are a number of very well documented correlations between specific genetic polymorphisms and cognitive phenotypes such as risk of alcoholism, cognitive outcome after traumatic brain injury, and, the efficacy of psychoactive drugs.

In the first half of the course we will review some of the classic papers describing genetic polymorphisms which affect cognitive phenotypes. This course will not, however, address the thorny questions of how to precisely define and measure those cognitive phenotypes. Rather we will focus on the molecular biology of those genetic polymorphisms and the neurobiology of the genes involved.

In the second half of the course we will discuss the pharmacogenetics of drugs used in the treatment of psychiatric and neurodegenerative diseases. These lectures will discuss polymorphisms in:

* Pharmacokinetic genes (Genes involved in drug metabolism and disposition),
* Pharmacodynamic genes (Genes encoding drug targets), and
* Pharmacotypic genes (Genes impacting disease presentation and subtype and therefore influencing the effectiveness of pharmacologic interventions)

# **Lecture schedule**

## Monday

8:00 – 8:45 Introduction to Human Neuroanatomy (Optional)

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9:00 – 10:15 Introduction; Structure of a gene and the naming of polymorphisms

10:15 – 10:30 Break

10:30 – 12:00 Serotonin transporter and heritability

12:00 – 13:00 Lunch

13:00 – 14:15 Dopaminergic neuroanatomy and the dopamine receptors

14:15 – 14:30 Break

14:30 – 16:00 DRD2 and linkage disequilibrium

## Tuesday

9:00 – 10:15 COMT and DAT

10:15 – 10:30 Break

10:30 – 12:00 Non-linearity of gene x gene interactions

12:00 – 13:00 Lunch

13:00 – 14:15 BDNF and the genetic signature of recent human evolution

14:15 – 14:30 Break

14:30 – 16:00 Cholinergic neuroanatomy and the habenula

## Wednesday

9:00 – 10:15 Cholinergic receptors and the example of CHRNA5/CHRNA3/CHRNB4

10:15 – 10:30 Break

10:30 – 12:00 CHAT/VACHT and the cholinesterases

12:00 – 13:00 Lunch

13:00 – 14:15 MAOA

14:15 – 14:30 Break

14:30 – 16:00 Population stratification and reproducibility

## Thursday

9:00 – 10:15 Overview of pharmacogenetics

10:15 – 10:30 Break

10:30 – 12:00 CYP genes

12:00 – 13:00 Lunch

13:00 – 14:15 Other genes involved in drug metabolism

14:15 – 14:30 Break

14:30 – 16:00 Clinical pharmoacogenetic testing in Prague (Dr. Tomek)

## Friday

9:00 – 10:15 Pharmacodynamic genes and Schizophrenia

10:15 – 10:30 Break

10:30 – 12:00 Pharmacotypic genes and Parkinson’s disease

12:00 – 13:00 Lunch

13:00 – 14:15 Pharmacotypic genes and Alzheimer’s disease

14:15 – 14:30 Break

14:30 – 16:00 Course review and wrap-up