

Mary Lilius Christian Hare (1902–1997)
Post-graduate student 1925-1928

Mary Hare was born in Gloucester and was an undergraduate at Cambridge before gaining a Bathurst Studentship at Newnham College to work in the Department of Biochemistry under Gowland Hopkins and Malcolm Dixon. In 1928 she isolated an enzyme that catalyzed the oxidative deamination of biogenic amines which she called tyramine oxidase. Hermann Blaschko (at the Institute of Physiology in Cambridge), Juda Quastel, (who had been a graduate student of Hopkins (1921-1924) and a demonstrator and lecturer in the department from 1923 to 1929) and others showed that this enzyme metabolized tyramine, dopamine, noradrenaline, adrenaline and aliphatic amines. The enzyme was eventually re-named monoamine oxidase (MAO) to indicate that its function is restricted to the oxidative deamination of monoamines.



Dr. Mary Bernheim

Humans have two MAO genes, *MAOA* and *MAOB*, with approximately 70% sequence identity. Both are expressed in neurons and astroglia: MAOA is also present in the liver, pulmonary vascular endothelium, gastrointestinal tract and placenta whilst MAOB is mainly found in blood platelets. Both MAOs are vital to the inactivation of monoaminergic neurotransmitters, for which they display different specificities. Serotonin, melatonin, noradrenaline and adrenaline are mainly broken down by MAOA. Phenethylamine and benzylamine are largely oxidised by MAOB. Both forms metabolize dopamine, tyramine and tryptamine.

On account of their role in the inactivation of neurotransmitters, abnormal expression of MAOs is thought to be responsible for a number of psychiatric and neurological disorders, e.g., schizophrenia, depression and attention deficit disorder. MAOA inhibitors act as antidepressant and anti-anxiety agents. MAOB inhibitors are used to treat Alzheimer's and Parkinson's diseases.

Whilst a member of the department Mary Hare met a fellow graduate student, the American Frederick Bernheim, and they married on December 17th 1928. They both became founding members of the faculty of Duke University Hospital and School of Medicine and Mary went

on to publish over sixty papers. Her faculty biography can be viewed on the Duke Medicine website: http://digitaldukemed.mc.duke.edu/med_women/women/mary_bernheim

References

Hare, M.L.C. (1928). Tyramine oxidase. I. A new enzyme system in liver. *Biochemical Journal* 22, 968-979.

Slotkin, T.A. (1999). Mary Bernheim and the discovery of monoamine oxidase. *Brain Research Bulletin* 50, Nos. 5-6, 373.