Published in final edited form as:

J Neural Transm (Vienna). 2018 November ; 125(11): 1517–1518. doi:10.1007/s00702-018-1920-2.

Special issue on monoamine oxidase, titled “Monoamine Oxidase Isoenzymes: Eternally Enigmatic Enzyme”

Jean Chen Shih [University Professor, Boyd & Elsie Welin Professor],
Department of Pharmacology and Pharmaceutical Sciences, School of Pharmacy

Department of Integrative Anatomical Sciences, Keck School of Medicine, Director, USC-Taiwan Center for Translational Research, University of Southern California, 1985 Zonal Avenue, PSC 518, Los Angeles, CA 90089-9121, (323) 442-1441 Phone, (323) 224-7473 Fax

Peter Riederer,
Klinische Neurochemie, Klinik und Poliklinik für Psychiatrie und Psychotherapie, Würzburg, Germany

Wakako Maruyama, and
Department of Health and Nutrition, Faculty of Psychological and Physical Science, Aichi Gakuin University, Nisshin, Aichi, Japan, 12 Araike, Iwasaki-cho, Nisshin, 320-0195, Tel: +81 0561 73 1111, Ext. 3494, FAX: +81 561 73 1142

Makoto Naoi
Department of Health and Nutrition, Faculty of Psychological and Physical Science, Aichi Gakuin University, Nisshin, Aichi, Japan, 12 Araike, Iwasaki-cho, Nisshin, 320-0195, Tel: +81 0561 73 1111, Ext. 3494, FAX: +81 561 73 1142

Foreword:

For the special issue on monoamine oxidase, titled “Monoamine Oxidase Isoenzymes: Eternally Enigmatic Enzyme”

After Mary L. C. Hare (later, Bernheim) reported the enzyme catalyzing oxidation of monoamines, later called as monoamine oxidase (MAO) in 1928, the structure, function and regulation of expression have been intensively studied. MAO was clearly identified as two independent protein species coded by different genes with selective affinity to substrates and inhibitors in 1988. These MAOs exhibit identical intron and exon organization derived from duplication of a common ancestral gene more than a million years ago, thus they are MAO A and B isoenzymes. MAO A and MAO B are localized to distinct cell types and tissues, with specific functions in the brain and peripheral tissues. MAO is associated with the regulation of monoamine neurotransmitters and is important for the development and maintenance of neuronal architecture and circuits. Further, MAO regulates motor coordination, cognition, multiple behaviors, mood and emotion, and recently has been implicated in carcinogenesis. MAO A and B knockout mouse studies demonstrate through “gene- environment interactions” that MAO A is involved in emotional behaviors such as

Correspondence to: Jean Chen Shih.

aggression, anxiety, impulsivity, and anti-social behaviors. MAO A and B inhibitors were developed as L-DOPA adjuncts and anti-depressants. Mechanistic investigations have yielded novel therapeutic strategies including neuroprotection in aging, neurodegenerative and depressive disorders. MAO has been shown to play a decisive role in cellular death and survival by its involvement in cellular signaling pathways and the mitochondrial apoptosis cascade.

Research on MAO has been developed through continuous discussion and cooperation among scientific investigators from different countries and research fields. The “Amine Oxidase Meeting” organized every two years in both global hemispheres has given us valuable opportunities to advance MAO research and form close lifelong friendships. As one generation of MAO researchers, we summarize our discoveries on MAO with challenging unanswered questions for the next generation to discover. In this special issue on MAO, we collectively merge historical discoveries with our latest findings on the enzymatic, pharmacological, genetic and environmental factors that influence MAO function with impact on a spectrum of neuropsychiatric disorders and cancers. In addition, the present and future aspects of MAO inhibitors are reviewed. We hope that this special issue on MAO will be able to help the readers to find new concepts for future study on MAO, based on what we have found.

References

Hare MLC (1928) Tyramine oxidase I. A new enzyme system in liver. Biochem J 22: 968–979 [PubMed: 16744124]