

Impairment of the biological clock system by environmental chemicals: Cross talk between heme, NO, translation and clock gene

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【Outline of survey】

Environmental chemicals impair the heme synthetic pathway and often cause emergence of red pigments on the skin of patients and heavy depression. Some of clock-gene-associated transcriptional factors contain heme as signal receptors. Impairment of the biological clock gene system may give rise to mental diseases such as insomnia, depression, alcoholism etc. NO gas, an important signal molecule, binds to heme and is synthesized by the heme enzymes. Heme-regulated kinase controls initiation of translation in the red cell and perhaps other organs. In the present project, we attempt to explore relationships between heme synthesis, NO, translation and clock gene expressions in order to understand the mechanism of several mental diseases associated with clock genes.

【Expected results】

We anticipate that understanding of the basic mechanism between heme synthesis, NO bindings to heme and proteins, heme-regulated translation and heme-associated transcription of clock gene will help in part to contribute to medical treatment for several mental diseases.

【References by the principal researcher】

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【Term of project】 FY 2005 - 2009

【Budget allocation】 85,500,000 yen.

【Homepage address】 <http://www.tagen.tohoku.ac.jp/labo/shimizu/>