

The effect of histamine on contact dermatitis using gene manipulated mice

Hiroshi Ohtsu

Applied Quantum Medical Engineering, Tohoku University School of Engineering

Since its discovery in 1910, histamine has been regarded as one of the most important biogenic amines in medical and biological field. Histamine regulate smooth muscle contraction, immune response, vascular permeability, neurotransmission, and stimulation of gastric acid secretion. Histamine is synthesized from histidine through oxidative decarboxylation by histidine decarboxylase (HDC; EC 4.1.1.22), a pyridoxal 5'-phosphate (PLP)-dependent enzyme. We generated histidine decarboxylase gene-knockout ($HDC^{-/-}$) mice and previously revealed that scratching behavior was exclusively induced in $HDC^{+/+}$ mice whereas it was barely observed in $HDC^{-/-}$ mice. Histological examination revealed that both $HDC^{+/+}$ and $HDC^{-/-}$ mice displayed similar extent of inflammatory cell infiltration, hyperplastic epidermis and newly spreading of neuronal processes in the skin tissue. Since several metal are ingredient of cosmetic material we started to consider that metal allergy is important for the cosmetics. The first step for the metal allergy is elution of metal ion into the skin. Therefore it is important to establish the measuring system of trace ionized metal in the skin. In this study we assessed metal allergy in mice using nickel wire implantation in their back skin and revealed that the amount of nickel ion in the tissue seems to be paralleled with the extent of inflammation. The amount of ionized metal in the skin tissue was measured using inductively coupled plasma atomic emission spectrometry (ICP-AES) and the surface of the metal wire was analyzed with X-ray diffraction (XRD) and scanning electron microscopy/energy dispersed X-ray analysis (SEM-EDX) method. To assess the extent of allergic reaction we generated HDC-promoter (1.1Kb) plus ZsGreen gene transgenic mice. It was shown that peritoneal macrophages in these mice were positively glittered under the fluorescent microscopy but we found that other cells which do not express HDC gene also glittered non-specifically. In this regards, we started to generate BAC based reporter mice to attain the accurate reflection of HDC expression in mice.