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Tissue Distribution of Divalent Metal Transporter 1 and Metal Transporter Protein 1, and Regulation by Dietary Iron in Rat and Mouse

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Iron (Fe) plays an essential role for biological processes. Metal transporters, divalent metal transporter 1 (DMT1) and metal transporter protein 1 (MTP1), are responsible for the Fe transport in mammalian. Therefore, the knowledge of the tissue distribution of transporters involving in transport of metals may provide a very valuable information in studying a target organ, metal-metal interaction and metabolism of metals in mammalian. In this study, we studied the tissue distribution of DMT1 and MTP1 in rat and mouse, and regulation of expression by depleting body Fe. Rat and mouse was divided into two groups in each, and fed the Fe sufficient (FeS: 120 mg Fe/kg) or Fe deficient (FeD: 2-6 mg Fe/kg) diet for 4 wks. Body Fe status was evaluated by measuring tissue Fe concentrations. The expression levels of DMT1 mRNA and MTP1 mRNA were analyzed in tissues by using the quantitative real time PCR method. In rats and mice, DMT1 and MTP1 were eventually expressed in all tissues studied. In FeS-diet fed rats, DMT1 was highly expressed in the testis and kidney, MTP1 was highly expressed in the spleen and lung. In mice, DMT1 was highly expressed in the kidney and spleen, MTP1 was highly expressed in the liver and spleen. In the digestive tract, metal transporters were markedly expressed in the duodenum. The depletion of body Fe upregulated the level of DMT1 and MTP1 expression in experimental animals, dramatically in the duodenum. However, the expression level of metal transporters was tissue-dependent and different from species.

keywords: iron, divalent metal transporter 1, metal transporter protein 1, real time PCR, depletion of body iron