Synopsis of Original Research Paper

# Transport mechanism of vitamin C essential for collagen synthesis

**Miki Hiasa**

*Okayama University, Faculty of Medicine, Dentistry and Pharmaceutical Sciences*

Collagen is abundant in skin and blood vessel walls and provides mechanical strength and flexibility to tissues and organs. Collagen is a protein synthesized by mesenchymal cells; it is synthesized intracellularly as procollagen, which is secreted extracellular space and then polymerized. In procollagen biosynthesis, proline is hydroxylated in the endoplasmic reticulum by proline hydroxylase, an enzyme that requires ascorbic acid, so-called vitamin C, as a coenzyme, to convert it to hydroxyproline. Hydroxyproline contributes to the stability of the triple helix structure, and a deficiency of vitamin C or proline hydroxylase results in immature collagen. Vitamin C is essential for collagen synthesis and maturation, but the mechanism by which vitamin C is transported to the endoplasmic reticulum, the site of proline hydroxylation, is not clear. In this study, we focused on glucose transporters (GLUTs) belonging to the SLC2A family as transporters that accumulate vitamin C in the endoplasmic reticulum. There are 13 subtypes of GLUTs, which are classified into Classes I-III based on amino acid sequence homology. GLUTs belonging to Class III have not been well studied, but they are intracellular membrane-localized transporters that recognize DHA, an oxidized form of vitamin C, as a substrate. The aim of this study is to demonstrate that GLUTs function as vesicular DHA transporters and to elucidate their physiological actions. We investigated GLUTs that are mainly expressed in collagen-secreting vascular smooth muscle cells and found that GLUT8, 10, and 12 are expressed in vascular smooth muscle cells (VSMCs). The fact that GLUT10 and 12 are well expressed in the endoplasmic reticulum and the low expression of GLUT12 suggests that GLUT10 is the GLUT that can function in the ER in VSMCs. To elucidate the physiological functions of GLUT10 as a vesicular DHA transporter, we plan to examine DHA transport activity and quantification of collagen and hydroxyproline in GLUT10 knockdown cells.