

H⁺-Coupled Sugar Transporter, an Initiator of Sugar-induced Ca²⁺-signaling in Plant Cells

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Using Ca²⁺-dependent photoprotein aequorin-transformed tobacco BY-2 cell suspensions, the sugar-induced increase in cytosolic free Ca²⁺ concentration ([Ca²⁺]_{cyt}) was investigated by measuring the luminescence intensity. When 0.5 M sucrose or some other sugars were fed to the cells, strong and transient luminescence was observed. Salts or sugar analogues didn't show this effect. In addition, the intensity of sucrose-induced aequorin luminescence was gradually enhanced when cells were exposed to sugar-starvation. This was observed with the concurrent expression of the sucrose/H⁺ co-transporter, *NtSUT1A*. The [Ca²⁺]_{cyt} increase may initiate Ca²⁺-signaling leading to the expression of genes related to biosynthesis of storage carbohydrates in a sink organ. The sugar-signaling may play an important role in the conversion on nutritional stage of plant tissue, source organ to sink organ.

Key words: Sugar Transporter, Sugar-signaling, Ca²⁺-signaling