

分子生物学科・環境科学研究センター・ SUPER FORUM 共催セミナーのご案内

2月10日(火) 16:20～17:30 理学部3号館二階11番教室

**Roles of SWEET uniporters in sugar efflux
and interaction with microorganisms in roots**

時間: 16:20-17:30 (講演50分、質疑応答20分)
演者: Dr. Woei-Jiun Guo (台湾 国立成功大学)

問い合わせ先:
高木 優(環境科学研究センター)





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Research Focus

Sugar Transport Physiology
Application of bionanoparticles
Plant Stress Biology

Abstract

Plant roots secrete a significant portion of assimilated carbon into the rhizosphere. For example, *Arabidopsis* seedlings have capacity to export 30–40% of total imported glucose into surrounding environment. However, molecular mechanisms and physiological roles of sugar exudation are little understood. SWEET (for *SUGARS WILL EVENTUALLY BE EXPORTED TRANSPORTERS*) sugar efflux carrier isoforms are candidates for sugar secretion from roots, since some members play key roles in sugar secretion in nectaries, pollen nutrition and phloem loading. In *Arabidopsis*, three SWEET uniporter members, SWEET17, 16 and 2 are highly expressed in root vacuoles, supporting a role in mediating root sugar efflux. Genetic evidences showed that SWEET17 plays a major role in facilitating bidirectional Frc transport on root tonoplasts to maintain cytosolic Frc homeostasis that in turn may facilitate root exudation and regulate Frc export from leaves. On the other hand, SWEET2 proteins also accumulate highly in root cells involved in sugar secretion, i.e. root tip and epidermal cells. Characterization of loss-of-function *sweet2* insertion indicated that SWEET2 reabsorbs secreted glucose at vacuoles to prevent carbon loss to the rhizosphere. Moreover SWEET2 is up-regulated upon root-born *Phythium* infection to reduce pathogen susceptibility. In conclusion, our studies demonstrated that sugar efflux from roots not only is important for sugar homeostasis in plant but also critical for microorganism interaction.

Reference:

1. Guo, W.J.*, Nagy, R., Chen, S.Y., Pfrunder S., Yu, Y.C., Santelia, D., Frommer, W.B.* and Martinoia, E. 2014 SWEET17, a facilitative transporter, mediates fructose exchange across the tonoplast of *Arabidopsis* roots and leaves. *Plant Physiol* Feb 164(2):777-789. (<http://dx.doi.org/10.1104/pp.113.232751>) *: co-correspondence
2. Chen, L.Q., Hou, B.H., Lalonde, S., Takanaga, H., Hartung, M., Qu, X.Q, Guo, W.J., Kim, J. G., Underwood, W., Chaudhuri, B., Chermak, D., Antony, G., White, F., Somerville, S., Mudgett, M. B. and Frommer, W.B. 2010 Sugar transporters for intercellular exchange and nutrition of pathogens. *Nature*. Nov (Article) 468: 527-532.