SL 204 **Utilization of Multiple Carbon Sources by Plant Cells**

Lee Taek Kyun, Suh Jung Bin, Kim Se Hee, Lee Sun Min and Lee Woo Sung*

Department of Biological Science, Sungkyunkwan University

It has been reported that suspension-cultured rice cells grown on mixed carbon sources of glucose (Glc) and acetate exhibited diauxic growth in which acetate was the preferred carbon source (Lee and Lee, 1996). Carrot (*Daucus carota* L.) suspension cells, showing a diauxic growth very similar to that of rice cells, were used to delineate the mechanisms underlying this preferential use of acetate over Glc. Uptakes of both Glc and 3-0-methylglucose (3-OMG), a non-metabolizable Glc analogue, were similarly inhibited when acetate or butylate, weak acids which are capable of transporting protons into the cytosol, were present in the uptake assay mixture containing cells harvested during the Glc-utilizing second growth phase. Inhibition of Glc uptake by these weak acids was similar when equivalent experiments were carried out with isolated plasma membranes. It was further shown that Glc uptake, which requires a proper proton gradient across the plasma membranes, was inhibited during the first growth phase by acetate-mediated alkalization of growth medium and/or simultaneous acidification of cytosol. This study strongly suggests that Glc utilization in plant cells is inhibited by co-presenting carbon source(s) which can alter the proton gradient across the plasma membrane. We further examined diauxic growth in culture containing Glc and malate. Unlike the case in the culture with Glc and acetate, carrot cells used Glc first. Malate was utilized only after Glc is depleted from medium. These results indicate that Glc can be a preferred or less-preferred carbon source depending on the competing carbon source. It was noted that malate was not directly taken up by cells. Instead it was converted extracellularly into fumarate which was subsequently transported into cells. During the malate-growth phase malate uptake was negligible, and fumarate uptake was active and pH-sensitive. It was shown that fumarase released into medium was responsible for the extracellular conversion of malate into fumarate. An immunoblot experiments showed that fumarase antibody raised against *Arabidopsis* fumarase provided positive signals only in medium in malate culture, not in fumarate or Glc cultures. This study demonstrates the first example in that fumarase, a mitochondria marker enzyme, can be present in places other than mitochondria.