Inorganic Phosphate Uptake in the Primitive Fungus *Blastocladiella emersonii* Is Coupled to Active H+ Transport

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INTRODUCTION: The determination of growth or sporulation in *Blastocladiella emersonii* is linked to phosphate (Pi) availability, but little is known about the energy metabolism and transport of Pi across the plasma membrane of this fungus. **OBJECTIVES**: The aim of the present work is to investigate the mechanisms of Pi uptake in *B. emersonii* and the involvement of Pi on cell differentiation. **MATERIALS AND METHODS:** *B. emersonii* was maintained by harvesting zoospores released after 24 h at 22 ± 1°C on indefinite PYG-agar growth medium (0.13% peptone, 0.13% yeast extract, and 0.3% glucose in 1% agar). In all cases, at least three independent experiments were performed in triplicate. The values shown in all experiments represent the mean±SE. Comparison among the different conditions was made using an unpaired t-test or Student's t-test. **DISCUSSION AND RESULTS:** Two genes that code for a H+:Pi transporter showing similarity with the high affinity transporter Pho84 of *Saccharomyces cerevisiae* were identified in the draft assembly of *B. emersonii* genome. No sequence coding for a Na+:Pi transporter (Pho89) was found in the B. emersonii, suggesting a possible lack of Pho89-like transporters. Pi uptake increased linearly with time and cell number but was not stimulated by Na+. The Pi transport in B. emersonii showed Michaelis-Menten kinetics with an apparent K0.5 = 0.19±0.02 mM and Vmax = 15.13±1.36 nmol x h-1 x 10-6 cells. The proton ionophore carbonyl cyanide-4-(trifluoromethoxy)phenylhydrazone (FCCP), and the inhibitor of H+, K+-ATPase 2-methyl-8-(phenylmethoxy)imidazo[1,2-a]pyridine-3-acetonitrile (SCH28080) both inhibited the transport of Pi. Both the Pi transport and the BePHO84 genes expression were modulated by environmental Pi variations and throughout cell differentiation. **CONCLUSION**: These findings suggest an H+:Pi symport system as the major mechanism for Pi uptake in *B. emersonii*, and gives preliminary evidences of the evolution of the phosphate uptake system in primitive fungi.

Keywords: Blastocladiella emersonii, Inorganic phosphate transport, Cellular differentiation

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