

# Cytosolic acidification as a signal mediating hyperosmotic stress responses in Dictyostelium discoideum

## ABSTRACT

By examining the effects of hyperosmotic stress and intracellular acidification on endocytosis, we propose that both hypoxia by high pH and reduced cellular activity are mediated by pleiotropic effects.

## INTRODUCTION

The mechanism of hyperosmotic stress responses in Dictyostelium discoideum is not well understood. The major pathways involved include hyperosmotic stress responses, hyperglycemia, hyperinsulinemia, and hyperglycemia induced by glucose. This review will focus on the mechanisms of hyperglycemia induced by glucose and will discuss the clinical and pathophysiological mechanisms of hyperglycemia induced by glucose.

### Hyperglycemia induced by glucose:

Dictyostelium discoideum is a case of hyperglycemia induced by glucose. There is a specific metabolic pathway involved in hyperglycemia induced by glucose. The pathophysiological mechanisms of hyperglycemia induced by glucose are Dehydration causes constant changes in external osmolarity, which can lead to stress conditions. When the external medium is hyperosmotic, cells expel water and shrink rapidly due To restore their volume, mechanisms called "regulatory volume increase" (RVI) are activated within minutes. In addition, when under long-term hyperosmotic conditions, compatible osmolytes such as polyols or amines are accumulated inside the cells. These osmolytes also display a stabilizing effect on proteins, prevent Recent research has revealed that certain cytoskeletal proteins are essential for survival in hypertonic environments, and the amoeba Dictyostelium discoideum exhibits an unusual response to hypertons. As a result, cells remain shrunken after water extrusion, while other organisms do not accumulate compatible osmolytes or stress factors. Little knowledge exists about the signalling pathways involved in osmoregulation: for example, an increase in GMP concentration at high stress level (hyperosmolarity) (GO) concentration), induces apoptosis (phosphorylation) of myocardial endothelial cell wall proteins (myosin kinase) and disassembles myosin II heavy chain by phosphorylating their respective homologues Doka under hypertonic conditions and showing that this pathway. Moreover, it is hypothesized that cAMP is an essential factor in the spore state (as described above) because of the amoeba developmental program, which naturally causes this hyperosmotic state; and the well-known adenylyl cyclases G (and is related to as an osmosensor) were found to prevent germination under the hyperosmotic state in sperm cells (Cytomarkers), but high levels of cleaving cytosol during perimancy. The external medium's acidification, which was thought to be caused by hypertonicity and the secretion of protons, was investigated in detail. We questioned whether this correlation is related to an increase in intracellular proton concentration. Cytosolic pH changes have been shown to signal various proteins and cellular processes in many organisms. Acidification of the cytosol, protein synthesis, DNA chemistry, motility, and alkalinization are also linked to decreased or increased activity or efficiency of a variety of activities. The paper suggests that cellular activity is generally lower due to high osmolarity, which leads to significant acidification and decreases endocytic activity and NTP pool.

## CONCLUSION

Our findings indicate that Dictyostelium cells under hypertonic conditions display significant internal acidification, depletion of the internal NTP pool, downregulation of vesicular mobility, block fluid-phase endocytosis, and exocellular activity acting as a signal mediator.