

Tardigrade proteins & desiccation tolerance

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ABSTRACT: Tardigrades, commonly known as water bears, are microorganisms that can survive extreme conditions: temperatures from $-274\text{ }^{\circ}\text{C}$ to $151\text{ }^{\circ}\text{C}$, pressures from 0 to 6,000 atmospheres, 103 times more radiation than the average animal, 10 days in space, 30 years frozen, and at least 10 years of dehydration. However, little is known about the mechanisms tardigrades use to survive these harsh environments. The Cytoplasmic Abundant Heat Soluble (CAHS) class of proteins is overexpressed by tardigrades under dehydration stress and the CAHS genes are essential for surviving dehydration. CAHS proteins form temperature-dependent reversible gel networks at higher concentrations, even in *Escherichia coli* cell lysates. Circular dichroism spectropolarimetry and multinuclear NMR spectroscopy data indicate that the purified proteins are intrinsically disordered in dilute solution. Additional characterization shows that purified CAHS proteins prevent dehydration-induced enzyme inactivation and stabilize the folded state of globular proteins.

ALL ARE WELCOME!