

Cold adaptation strategies and the potential of psychrophilic enzymes from the antarctic yeast, *glaciozyma antarctica* PI12

ABSTRACT

Psychrophilic organisms possess several adaptive strategies which allow them to sustain life at low temperatures between -20 to 20 °C. Studies on Antarctic psychrophiles are interesting due to the multiple stressors that exist on the permanently cold continent. These organisms produce, among other peculiarities, cold-active enzymes which not only have tremendous biotechnological potential but are valuable models for fundamental research into protein structure and function. Recent innovations in omics technologies such as genomics, transcriptomics, proteomics and metabolomics have contributed a remarkable perspective of the molecular basis underpinning the mechanisms of cold adaptation. This review critically discusses similar and different strategies of cold adaptation in the obligate psychrophilic yeast, *Glaciozyma antarctica* PI12 at the molecular (genome structure, proteins and enzymes, gene expression) and physiological (antifreeze proteins, membrane fluidity, stress-related proteins) levels. Our extensive studies on *G. antarctica* have revealed significant insights towards the innate capacity of- and the adaptation strategies employed by this psychrophilic yeast for life in the persistent cold. Furthermore, several cold-active enzymes and proteins with biotechnological potential are also discussed.