Animal Biology

Proteomic identification of an alpha class glutathione *S*-transferase in freshwater snails (*Bulinus globosus*)

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Abstract

Bulinus globosus is a freshwater snail that serves as intermediate host for *Schistosoma haematobium* and is known to be drought-tolerant. A previous report on the alteration in the status of glutathione *S*-transferase (GST) in *B. globosus* during aestivation and recovery, suggested that GST might be involved in the adaptation of the organism to drought. Therefore, the present study aims to characterize GST isoforms that are displayed in snails under drought stress, sampled during the dry season, and those under recovery, sampled during the rainy season. Our data show that the hepatopancreas contained the highest level of GST compared to foot muscle, hemolymph, and visceral mass. GST activity in the hepatopancreas of snails under drought stress was about 2–3 times higher than that of the recovered snails. Activity staining of a polyacrylamide gel revealed that *B. globosus* both in the active and inactive state has at least three forms of GST. Based on SDS-PAGE, the multiplicity of the main GSTs in the hepatopancreas of *B. globosus* (*Bg*GSTs) was further revealed by the presence of five protein bands. In addition, LC-MS/MS analysis of *Bg*GST 2, 3 and 4 revealed the expression of alpha GST. In conclusion, *B. globosus* exhibits tissue-specific expression of multiple GSTs with elevated activities when the organism is under stress. Elevated activities coupled with an alpha GST class expression accentuate the role of *Bg*GSTs as an antioxidant defense system, in particular under stress conditions.

Keywords

Bulinus globosus; characterization; drought-tolerance; glutathione S-transferase; isoenzyme; mollusc.

Supplementary material

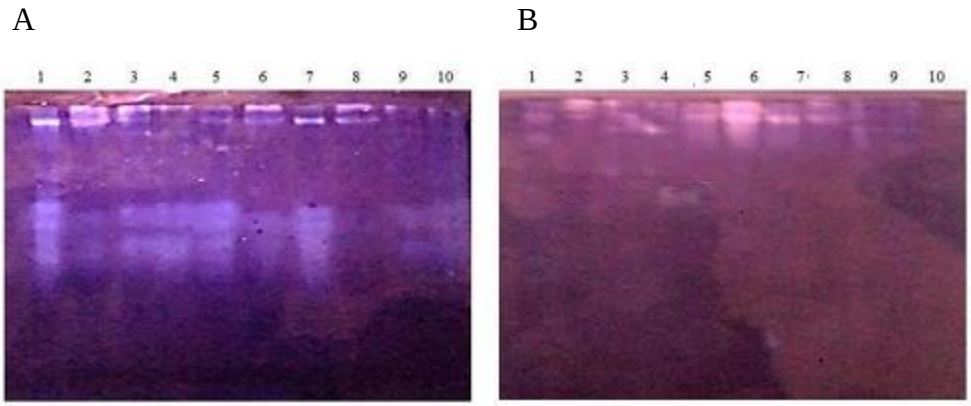

Figure S1. Expression pattern of glutathione *S*-transferase in the tissues/organs of *B. globosus*. (A) Electrophoretogram of GST activity staining performed on 10% non SDS-PAGE. Gel was incubated in 0.1 M phosphate buffer containing nitroblue tetrazolium, reduced L-glutathione and 1-chloro-2,4-dinitrobenzene. (B) Control gel incubated in 0.1 M phosphate buffer containing nitroblue tetrazolium and reduced L-glutathione without 1-chloro-2,4-dinitrobenzene.

Lanes 1, 5 and 7: crude GST from hepatopancreas GST); lanes 4 and 10: crude GST from visceral mass; lanes 3 and 9: crude GST from foot muscle; lanes 2 and 8: crude GST form hemolymph. Lanes 1–6 are crude extracts from inactive *B. globosus*, while lanes 7–10 are crude extracts from active *B. globosus*. An equal amount of protein (0.144 mg) was loaded in each well. The control gel was necessary to prove that the upper achromatic bands were not generated as a result of GST activity.