Hsp70 induction in the sponge *Chondrilla nucula* as a biomarker for heavy metal stress in the Tyrrhenian Sea

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Abstract

In the framework of the present study Hsp70 induction caused by heavy metal stress in the sponge *Chondrilla nucula* was observed. The study was carried out at two sites of the Tyrrhenian Sea.
Initially, experiments were carried out with the focus on Hsp70 degradation. The results revealed that luminescence intensities decreased, both by freezing and thawing the samples as well as by incubation at room temperature. Consequently it can be assumed that multiple thawing as well as storage at room temperature will redound to degradation of Hsp70 proteins. Furthermore it was noticeable, that the intensities after longer storage at room temperature led to stronger decrease then by multiple freezing.
The results of the immunoblots revealed considerable fluctuations in luminescence intensities of the single readings. These were manifested not only within the single experiments but also by their comparison. Recapitulating, the results show a weak trend for a higher Hsp70 expression at one of the two studied sites (Scarlino). Nonetheless, due to the high variance within all analysed samples this trend is statistically not significant.
The results of this study raise the question if it is practicable to use *Chondrilla nucula* as a monitoring organism and Hsp70 as a biomarker. *Chondrilla nucula* as the study object or sponges in general are queried because a precise determination of Hsp70 expression was difficult. On the one hand this was due to the strong degradation of proteins and on the other hand due to problems regarding the determination of protein content.
The interpretation of the gained results is difficult as well. Up to date, induction of Hsp70 due to heavy metal stress in invertebrates and vertebrates has been detected in many experiments. Nonetheless, references increase that Hsp70 does not provide a universal instrument for biomonitoring to the degree hoped for. The kinetics of the stress-response produces problems because the values for the expression of Hsp70 cannot be assigned clearly.
It seams expedient to consider fewer Hsp-families - like Hsp70 - for future studies rather than a combination of different classes and isoforms of stress proteins.