Seasonal variability in cell and tissue-level biomarkers in mussels, *Mytilus galloprovincialis* from Galicia and Biscay Bay

Larraitz GARMENDIA, Manu SOTO, Miren P. CAJARAVILLE, Ionan MARIGÓMEZ
Laboratory of Cell Biology & Histology, Department of Zoology & Animal Cell Biology, School of Science & Technology, University of the Basque Country, 644 P.K., E-48080 Bilbo, Basque Country, Spain

ABSTRACT

In order to obtain sustained conclusions regarding the effects of the Prestige oil spill in the monitoring campaigns carried out from Galicia to Basque Country since 2003, baseline values for the biomarkers recorded and their variability associated to varying natural factors (water surface temperature, salinity, tidal ranges and food availability) needed to be determined. For this purpose, mussels *Mytilus galloprovincialis* were collected monthly in Oia (Galicia) and Mundaka (Basque Country) from April 2005 to May 2006 to investigate whether seasonal variability in biomarkers follows the same pattern in both geographical areas. The effects of the Prestige oil spill were supposed to be minimal during the seasonality study period, since most biomarker values started to recover started in mid 2004 and along 2005 (Cajaraville et al., 2006).

A battery of exposure and effect biomarkers were investigated including lysosomal membrane stability (labilisation period, LP), lysosomal structural changes (lysosomal volume density, VvL; lysosomal surface-to-volume ratio, S/V and lysosomal numerical density, NvL), intracellular neutral lipid accumulation (volume density of neutral lipids, VvNL), cell type composition as relative proportion of basophilic cells in the digestive gland epithelium (volume density of basophilic cells, VvBAS), structural changes of digestive alveoli (mean epithelial thickness, MET and mean luminal radius to mean epithelial thickness, MLR/MET) and digestive gland histopathology. Additionally, gonad index (GI) was measured as supporting parameter.

LP did not show a clear seasonal variability pattern in both localities, values being higher than 15 min in most studied months. Lysosomal stereological parameters showed the same seasonal pattern in Galician and Basque coast, with higher VvL values in summer and autumn than in winter and spring. Maximum S/VL values were observed in winter. Similarly, VvNL values showed parallel seasonal dynamics in both localities, although in general the values were higher in Mundaka than in Oia. Alike, VvBAS, MET and MLR/MET exhibited a seasonal variability pattern that was similar in both localities, although higher VvBAS values and lower MET values were detected in Oia than in Mundaka. On the other hand, histopathological examination showed differences between both localities for the most important parasites (Rickettsia/Chlamydia-like organisms, *Nematopsis* spp and copepods). In general, *Nematopsis* spp and *Mytilicola intestinalis* prevalences and infection intensities were higher in Mundaka than in Oia. Rickettsia/chlamydia-like (R/CLO) organisms were almost absent in Mundaka, and very few R/CLO cases were recorded in Oia, where the infection intensity was eventually above 25% in May 2005 and 2006.

In general terms, it is concluded that there are not significant geographical differences between Oia and Mundaka in the seasonal variability pattern for most studied biomarkers. Thus, obtained baseline values can be used as reference values for biomonitoring programmes carried out in coastal areas from Galicia to Basque Country to assess the biological effects of the Prestige oil spill (Cajaraville et al., 2006; Marigómez et al., 2006; Orbea et al., 2006).

Funded by the Spanish MEC (VEM2003-20082-C06-01), Basque Government (ETORTEK actions-IMPRES) and the University of the Basque Country (grant to Consolidated Research Groups).

REFERENCES

