

In sickness and in health: An ontogenetic and nutritional approach to understand changes in blood cell populations of free-living California sea lion pups

Adriana Estefanía Flores-Morán

Unit for Basic and Applied Microbiology. School of Natural Sciences. Autonomous University of Queretaro (UAQ). Queretaro, Mexico.

Summary

Blood cell populations play different roles in the body, including those related to the immune system, regulation of CO₂ and O₂ levels, and coagulation, among others. Physiological and pathological alterations in homeostasis can be reflected by changes in the number and morphology of blood cell populations (Linderkamp et al., 2006; Ruef and Linderkamp, 2006; Proytcheva, 2009; Díaz-Miron et al., 2013). We conducted a detailed hematological analysis of California sea lion pups (*Zalophus californianus*) born in the Gulf of California, and examined changes in red blood cells and platelet morphology, as well as in leukogram patterns of clinical relevance during distinct stages of pup development, from birth to 12-months of life, and investigated how these changes are related to feeding patterns and to levels of erythropoietin and iron, as indicators of early nutritional status. We obtained reference values for free-ranging pups born in breeding colonies within the Gulf of California, and found some differences with previously reported values for stranded pups, particularly in terms of basophil and neutrophil counts. More importantly, our results showed that cell numbers and morphology of erythrocytes vary during early stages of pup development. Levels of erythropoietin, ferritin and stable isotopes were found to vary with development. We were able to identify key physiological process such as physiological anemia in the neonate pups. Our study has established reference hematology values for free-ranging, apparently-healthy California sea lion pups at different stages of their development, and provided information on how blood values reflect ontogenetic stages, nutritional status and feeding ecology. Considering that the California sea lion is a sentinel species, the knowledge obtained by our research project could be useful for understanding wider ecological processes in the coastal marine ecosystem.

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