
DISSERTATION ABSTRACT

Aspengren, Sara. **Melanophores – functional and morphological studies of intracellular transport and transfer of melanosomes.** Department of Zoology, Zoophysiology, Göteborg University, Box 463, SE-405 30 Göteborg, Sweden.

In order to adapt to the environment or to signal to other individuals, some animals, e.g. fish and frogs, have developed the ability to rapidly change the colour of their skin, using specialized pigmented cells called melanophores. The black or brown pigment melanin is found in membrane-enclosed melanosomes, which co-ordinately disperse throughout the cell or aggregate in the cell centre upon external stimuli. Melanosomes can also be transferred to surrounding skin cells, providing long-term colour change. The aim of the present thesis was to increase the knowledge about regulation, intracellular transport and transfer of melanosomes.

Primary cultures of melanophores from the Atlantic cod, *Gadus morhua*, and an immortalized melanophore cell line from the African clawed frog, *Xenopus laevis*, were used for immunocytochemistry, light- and electron microscopy, microplate assays and immunoblotting. In the melanosome transfer study, *Xenopus laevis* melanophores and fibroblasts were co-cultured and transfer was observed and quantified using light- and electron microscopy in combination with fluorescent cell trackers.

Tyrosine phosphorylation was found to be an important switch signal for melanosome aggregation, independent of receptor type and species. Spectrin was identified as a putative new key player in melanosome transport, since it co-localized with dynactin on melanosomes during both aggregation and dispersion. Microtubules and actin filaments were found to interact closely in melanophores; disruption of either component severely impaired the morphology and function of the other component. The neurotoxin acrylamide and the depigmentating agent hydroquinone both affected microtubules and actin filaments, thereby mainly inhibiting aggregation. Hydroquinone induced a loss of the microtubule-organizing centre of the cells. The results show that melanophores provide an interesting model system for studying toxic effects of various compounds, since cytoskeletal integrity is of importance for many vital cellular functions, such as intracellular transport and cell division. In co-cultures of melanophores and fibroblasts, as well as in frog skin, it was shown that melanosomes were released by melanophores and taken up by fibroblasts. Furthermore, the presence of fibroblasts affected the morphology of melanophores.

Key words: colour change, melanophore, melanosome, intracellular transport, cytoskeleton, molecular motors, pigment transfer

ISBN 91-628-6716-4