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Characterization of the pattern of cytokeratin proteins in the epidermal cells of loach, *Misgurnus anguillicaudatus* (Cypriniformes)

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Abstract

The pattern of cytokeratin proteins in the epidermal cells of loach was studied by immunotechniques and partial separation of the epidermal cells. Two monoclonal antibodies, namely 8F7 and 1C45, against the cytokeratin proteins of the loach epidermis were prepared. These two monoclonal antibodies exhibit distinctive results in immunohistochemical staining. The 8F7 monoclonal antibody stains mainly with the epithelial cells, while the 1C45 monoclonal antibody stains specifically with the club cells. The pattern of cytokeratin proteins in the club cells and the epithelial cells of various epidermal layers was further determined by partial separation of these cells. Immunoblotting analysis of the cell fractions confirms the cytokeratin proteins to be differentially expressed in the club cells and the epithelial cells. However, the cytokeratin proteins expressed in the epithelial cells of the basal, middle and outer layers are same. The results indicate that differentiation of the epithelial cells seems limited during their translocation from basal to upper layers, but in those cells that do differentiate into club cells, the cytokeratin pattern changes.

Introduction

The fish epidermis is a stratified squamous epithelium that is comprised mostly of epithelial cells, although other less numerous cell-types, such as mucous cells and club cells, are also present (Whitear 1986). The epithelial cells are also known as filament-containing cells (Henrikson and Matoltsy 1968) because of the abundant intermediate filaments (cytokeratin filaments) in the cytoplasm. The club cells and the mucous cells are large, terminally differentiated cells. Previous study on cell renewal in the loach, *Misgurnus anguillicandatus*, epidermis indicated that the club cells and mucous cells are differentiated from the epithelial cells. In addition, the epithelial cells of all epidermal layers are capable of proliferation (Tsai 1996). This is true not only in the loach, but also in the goldfish, *Carassius auratus* (Henrikson 1967) and plaice, *Pleuronectes platessa* (Bullock *et al.* 1978). The feature makes fish epidermis quite different from the epidermis of terrestrial animals in which the proliferation of the epidermal cells is confined to the basal layer (Eckert 1989). As has been documented for many renewing tissues, such as the mammalian epidermis (Eckert 1989; Hall and Watt 1989) and the intestinal epithelium (Leblond 1981), cell proliferation and cell differentiation are more or less mutually exclusive. Therefore, a study focused on the differentiation on the epidermal cells of loach might well also have an impact on our understanding of cell renewal in the fish epidermis.

Cytoskeletal proteins are responsible for many vital cell functions including maintenance of cell shape and motility (Kolega 1986; Wang 1991; Stossel 1993). However, during the last two decades, numerous advances have revealed that the expression of the cytoskeletal proteins is also closely related to cell differentiation. This is espe-