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RESEARCH ARTICLE

NON KERATINOCYTES OF ORAL MUCOSA- A BRIEF REVIEW

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ABSTRACT

Non keratinocytes are a group of cells in the oral mucosa which exhibit unique structural features and perform various functions. The Melanocytes, Merkel Cells, Langerhans Cells and Inflammatory cells constitute the group of oral non keratinocytes. These cells are also called clear cells and do not take part in epithelial maturation. Proper synchronization of the keratinocytes and non keratinocytes is essential for maintaining the epithelial homeostatsis. The non keratinocytes of the oral mucosa have been discussed here with a view to explore their origin, structure and functional characterestics in a concise pattern.

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INTRODUCTION

The oral mucosa is a complex structure consisting of various types of tissues. The epithelial component of oral mucosa chiefly consists of stratified squamous epithelium. The major constituent of these epithelial cells are the keratinocytes. Apart from these keratinocytes there is another group of cells called the non keratinocytes which vary distinctively from the keratinocytes in their structure, origin and function. Unlike the keratinocytes these cells do not participate in epithelial maturation. Histological evaluation of these cells has shown presence of clear cells around their nuclei and hence these have been termed as "clear cells". These cells are of four types and perform different functions. The melanocytes, langerhans cells, merkel cells and lymphocytes constitute the non keratinocytes and account for 10 % of the cells of the oral epithelium. Except Merkel cells these cells lack the desmosomal attachments and hence during tissue processing the there is cytoplasmic shrinkage around the nucleus giving a halo around the nucleus and hence the name "Clear cells".

The Melanocytes

Origin: The melanocytes are the pigment producing cells of the epithelium. Melanocytes originate from the neural crest cells. Specific type of neural crest cells delaminate and migrate along the dorsolateral pathway and differentiate into melanoblasts. The melanoblasts differentiate and ultimately penetrate through the dermis into epidermis producing melanin (Silver *et al*., 2008)

Structure: Melanocytes have long dendritic processes that extend through the various cell layers. The melanocytes synthesize melanin in small structures called melanosomes (Nanci, 2008).

Function: Pigmentation of skin and mucosa is the major function of the melanocytes. The degree of pigmentation is determined by the activity of melanocytes and not by their number. Each melanocyte makes contact with 30-40 keratinocytes and make up the epidermal melanin unit. The activity of the melanocytes is responsible for imparting skin colour and also provides protection against harmful UV radiation (Tsatmali *et al*., 2002). According to Slominski *et al*. melanocytes also secrete signalling molecules which function as regulators maintaining epidermal homeostasis (Slominski, 1993a) .

The Merkel Cells

Origin: Merkel cells were first described by Friedrich Sigmund Merkel in 1875 and he named them as "Tastzellen" (touch cell) (Moll *et al*., 2005). There are two theories regarding the origin of merkel cells.

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One theory suggests that they originate from the neural crest cells and ultimately migrate to the epithelium (Halata *et al*., 2003). The other one suggests their origin from the epidermal progenitors (Winkelmann, 1977).

Structure: These cells measure about 10–15 μm and are present in the basal layer individually or in clusters. Unlike the other clear cells these cells possess desmosomal attachments. They also have dense core granules containing neuropeptides (Lucarz, 2007). Finger like surface projections maintain connections with the surrounding keratinocytes (Ashok, 2017)

Function: Merkel cells are mechanoreceptors responsible for light-touch responses through the merkel nerve endings (Maricich *et al*., 2009). These cells also have neuroendocrine function by release of neuropeptide substances (Hartschuh *et al*., 1984).

Langerhans cells

Origin: According to Frlinger, Katz *et al*. Langerhans cells are derived from the bone marrow and appear in the epidermis in 7th week of intrauterine life (Cutler *et al*., 2006). The promonocytes are most likely considered as the bone marrow precursor of langerhans cells as they exhibit similar surface marker characterestics of the macrophage monocyte series and perform same immunological functions as those of the 1a bearing macrophages (Sting, 1978).

Structure: Langerhans cells are star shaped cells having dendritc extensions that protrude through several layers of keratinocytes and transfer antigens without disturbing the permeability barrier (Deckers Julie *et al*., 2018). Ultrastuctural examinations show presence of Birbeck granules in the cytoplasm which internalize viruses (de Witte *et al*., 2007). These Birbeck granules are electron electron dense organelles having tennis racket appearance (Birbeck, 1961). Based on their morphological appearance Langerhans cells are classified into two types- Type 1 Langerhans cells present in the suprabasal layer and are pyramidal in shape. These cells contain greater number of Birbeck granules, electron-lucent cytoplasm and longer dendritic processes. Type 2 Langerhans cells are present in the basal layer and are spherical in shape. They have lesser amount of Birbeck granules, electron dense cytoplasm and shorter dendritic processes (Lombardi *et al*., 1993)

Function: The langerhans cells function as antigen presenting cells by means of Toll like receptors. The toll like receptor ligands help in maturation of the bone marrow dendtitic cells which causes antigen recognition and uptake. The Langerhans cells locally process the antigens and migrate out to the lymph nodes where they present the antigens to the T cells. In the course of this journey to the lymph nodes the Langerhans cells mature and acquire improved ability for T cell co-stimulation. (Datta, 2003). The Birbeck granules function in receptor mediated endocytosis and transport of cellular materials into the extracellular space.

Inflammatory cells: The presence of inflammatory cells can be noted in the oral epithelium in association with other non keratinocytes. Unlike the other non keratinocytes, these cells are transient and do not possess the ability to reproduce in the epithelium.

The most common inflammatory cell is the lymphocyte, though polymorphonuclear leukocytes and mast cells may also be present (Nanci *et al*., 2008).

Conclusion

The non keratinocytes account for only 10% of the cells of the oral epithelium. Though small in number compared to the keratinocytes these cells perform unique functions which are an integral part of the epithelium. Thus a thorough understanding of these cells in relation to their origin, structure and function is important for clear understanding of the functions of the oral mucosa.

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