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Differentiation of Epidermal and Hair Follicle Stem Cells in Rat Newborn Skin from Maternal Diabetes After Treated with Propolis or Olive Leaf Extract

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The homeostasis of all self-renewing tissues is dependent on adult stem cells. The epidermis is maintained through self-renewal of stem cells and differentiation of their progeny to form the lineages of the interfollicular epidermis and adnexal structures, including the hair follicles and sebaceous glands. One location of epidermal stem cells is the permanent portion of the hair follicle, known as the bulge. It is likely that the adult stem cell repertoire responsible for maintaining the different components of the mammalian skin is established during late prenatal/early postnatal development. Diabetes mellitus is a chronic metabolic disease which is one of the major contributors to chronic wound healing problems. Diabetic dermopathy is the most common cutaneous findings in diabetes patients and progressive thickness lost in the skin epithelium was also seen in early diabetes. Maternal diabetes could increase deformation of hair follicles, vacuolation, and degeneration of epidermal cell layers and disrupt epidermal cell differentiation in newborns.

The aim of this study was to evaluate epidermis and hair follicle stem cells function in newborn skin from maternal diabetes using immunohistochemical staining.

Adult female Wistar Albino rats were intraperitoneally injected with streptozotocin (45 mg/kg) dissolved in 0.1 ml sterile citrate buffer (0.01 M sodium citrate, pH 4.5) for 5 consecutive days. A week later after the 1st injection, tail vein blood glucose levels of mice with at least 12 hours starvation was measured by using glucose strips when blood glucose levels were 280 mg/dl, they were accepted as "diabetic" and they were mated with non-diabetic males to obtain newborns and randomly divided into 3 groups. First group pregnant rats were used a control group and were fed a standard diet, and water. Second and third group pregnant rats were fed standard diet but in their water was added olive leaf extract (50 mg/kg/day) or propolis (50 mg/kg/day), respectively. The blood glucose was measured every week. The first day of postnatal period, skin biopsies were taken from newborn from all groups. They were fixed with 10% formalin solution and embedded in paraffin using routine paraffin embedding protocols. The sections were stained with hematoxylin-eosine for histochemical analyses, or anti-cytokeratin-8, anti-cytokeratin-14, anti-CD133 and anti-CD117 antibodies for analyses immunohistochemical distribution of them.

The blood glucose levels were lower in mother with feeded with propolis. After histochemical analyses, all epidermal layers were detected in skin biopsies from all groups, but, vacuoles in epidermal cells were observed in all group, but, they were less in propolis feeding group. After immunohistochemical analyses, the cytokeratin-8 immunoreactivity was negative in all groups, cytokeratin-14 immunoreactivity was more abundant in newborn skin feeded with olive leaf extract or propolis. While CD133 immunoreactivity was detected in both basal layer of epidermis and hair follicle cells in newborn skin feeded with propolis, it was only detected in basal layer of epidermis in newborn skin feeded with olive leaf extract. In addition, CD117 immunoreactivity was only observed hair follicle cells in newborn skin treated with propolis.

Our results suggested that, the mitotically active basal layer of the newborn skin from maternal diabetes was more expressed cytokeratin-14 after feeding with olive leaf extract or propolis. However, epidermal and hair follicle stem cells were more active in newborn skin feed with propolis. When the propolis feeding may regulate blood glucose levels and its may provide to differentiation and function of stem cells in skin.

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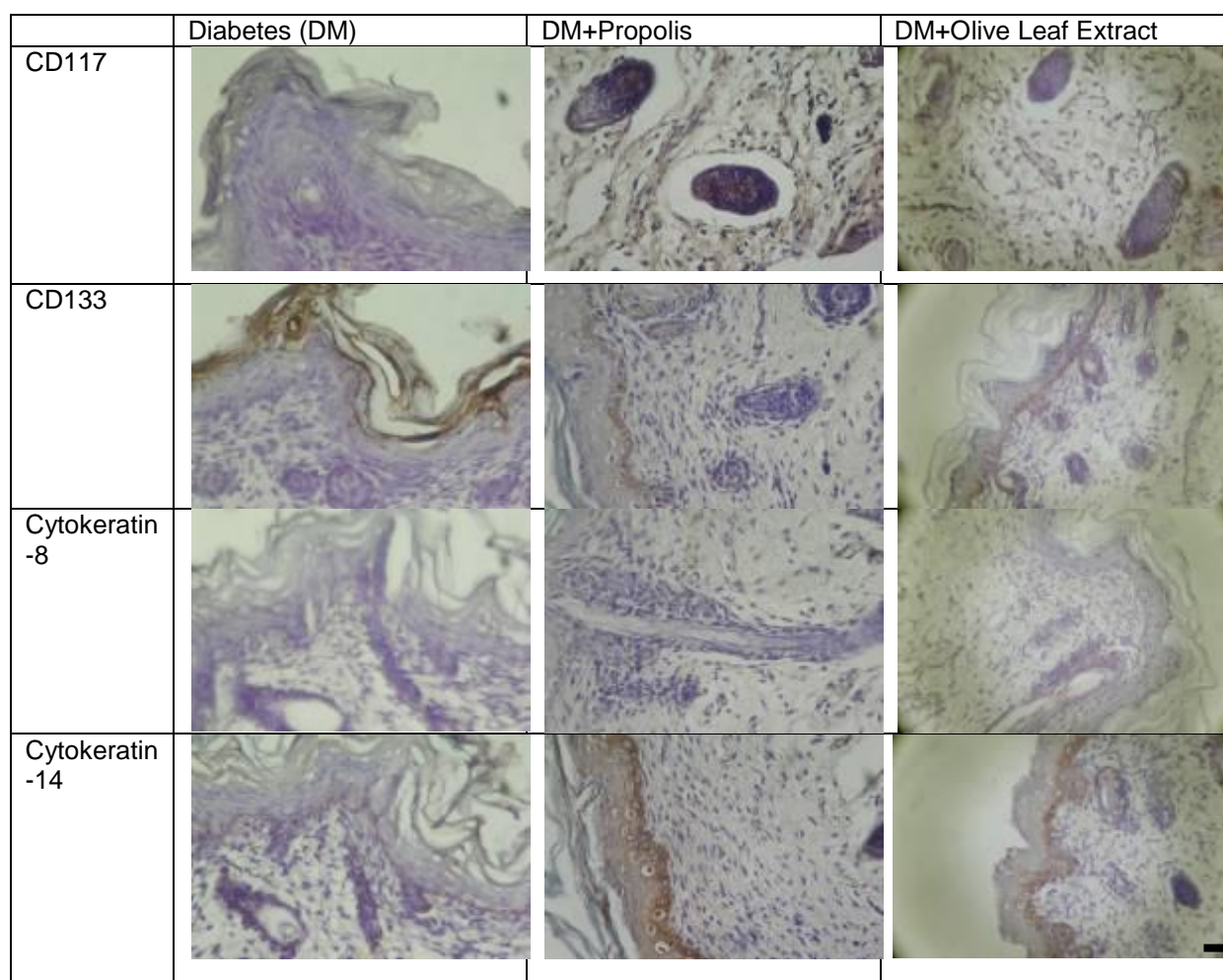


Figure 1. Expression of CD117, CD133, Cytokeratin 8 and 14 in skin from diabetes, DM+propolis or DM+olive leaf extract feed newborn (scale bar = 25 μ m).