Trefoil factor family (TFF) protein 1, 2 and 3 are low molecular weight peptides predominantly secreted in the gastrointestinal system, but also found in many different tissues, including nervous, respiratory and urinary system. They are also present during the embryonic development [1]. These proteins have an important role in epithelial protection by promoting epithelial restitution [2,3]. The aim of this research was to determine if TFF proteins are present in the developing embryonic epidermis.

Mouse embryos were isolated at E15 to E17 developmental stages (stages 23 to 25 according to Theiler), fixed in 4% paraformaldehyde and embedded in paraffin blocks. Blocks were cut into 6µm sagittal sections and transferred onto adhesive slides. Slides were incubated overnight with primary polyclonal rabbit anti-TFF1, anti-TFF2, and anti-TFF3 antibodies at 4°C, and negative controls with PBS. Biotinylated anti-rabbit antibody was applied the next day, followed by streptavidin HRP layer, and finally DAB for the visualization of the immunocomplexes.

Embryonic epidermis showed presence of all three TFF proteins at all monitored stages. Staining was mild to moderate for TFF1 and TFF2, and moderate to strong for TFF3. At stage E15, the signal was widespread, although less pronounced in stratum basale, and mostly sparing stratum corneum. At stages E16 and 17, the signal was more restricted to stratum granulosum and stratum spinosum, while stratum corneum and stratum basale showed little or no staining.

Positive staining for TFF proteins in embryonic mouse epidermis is in line with known properties and roles of these proteins in cell migration and apoptosis. Taken into consideration that TFF1 and TFF3 were found in primary mucinous skin carcinomas, but another study found no TFF immunostaining in normal adult human skin, our findings point to possible connections between mechanisms of carcinogenesis and embryonic development [4,5]. Further research may elucidate the impact of TFFs in the development of the epidermis.


Acknowledgement: The authors wish to thank Ms. Danica Matic for her valuable help in the histology laboratory.
Fig. 1: TFF1 signal in the epidermis of mouse embryo (17 days), predominantly in stratum granulosum and stratum spinosum.

Fig. 2: TFF2 signal in the epidermis of mouse embryo (17 days), mostly pronounced in stratum granulosum with mild staining in stratum spinosum.

Fig. 3: TFF3 signal in the epidermis of mouse embryo (17 days), strong signal in stratum granulosum and moderate in stratum spinosum.