

## **Molecular basis of transglutaminase reactions in the skin epidermis formation: development of efficient detection system of transglutaminase 1 activity using preferred substrate peptide**

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Transglutaminase 1 (TGase 1) is an essential enzyme for cornified envelope formation in stratified squamous epithelia. This enzyme catalyzes the cross-linking of glutamine- and lysine residues in structural proteins in differentiating keratinocytes. We had used a phage-displayed random peptide library for screening of primary amino acid sequences that are preferentially selected by human TGase 1. We had identified the most reactive sequence (K5) by evaluation of reactivity as GST-fused recombinant protein. In this study, we have confirmed that K5 appeared to have high and specific reactivity as substrate, even in the peptide form. Furthermore, *in situ* analysis of mouse skin sections using the fluorescence-conjugated K5 peptide resulted in the detection of TGase 1 activity with high sensitivity. Additionally, we have established a specific assay system using this peptide. In conclusion, we have established *in situ* and *in vitro* detection system using substrate peptide as sensitive and specific detection of endogenous TGase 1 activity in the skin.