# EVALUATION OF REGENERATION POTENTIAL OF NONWOVEN-BASED GELATIN/POLYCAPROLACTONE MEMBRANES (NBMs) ON SOFT TISSUE IN VITRO AND IN VIVO

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## Aim of the study

1. Evaluation of cell proliferation, differentiation and presentation of keratin molecules of Human gingival fibroblasts (HGF), human osteoblast-like cells, human umbilical vein endothelial cells and human oral keratinocytes (HOK) grown on NBMs in comparision to Mukograft in vitro
2. Evaluation of soft tissue regeneration in sock preservation covered by NBMs in comparision to Mucograft in vivo

## Background of the study

Update a great challenge for clinician and scientist in periodontology and implantology is still on regeneration of soft tissue. Gingival recession and subsequent root surface exposure is a common occurrence and often requires treatment due to aesthetic concerns or root sensitivity. Periodontal defect causes lack of volume of both and soft tissues for implant reconstruction. In terms of root coverage and gain in keratinized tissue, the connective tissue grafts (CTG) is the most predictable procedure and considered the gold standard for root coverage care. However, major shortcomings of harvesting CTGs are patient morbidity associated with the second surgical site, as well as the limited supply of donor tissue for the treatment of multiple recession defects.
In implant dentistry, socket grafting following an atraumatic extraction has become an integral part of general dental treatment and should be offered to patients to prevent bone resorption. This will often impede ideal dental implant placement in the future so that a secondary invasive grafting surgery will be prevented. One of the main issues that compromises the use of socket grafting techniques is the fact that epithelium invagination of the grafted site is more pronounced than bone integration. The graft material needs to be protected from the epithelial growth. For these reasons, an idea substitute biomaterial for the autogenous donor tissue is desirable. One of collagen soft tissue material Mucograft® is originally manufactured from porcine, which is a collagen matrix o used as a substitute in cases of loss of the connective tissue structure. It has been used to replace the connective tissue graft from the palate, as well as for recession coverage and regeneration of keratinized mucosa around teeth and implants. Additionally, Mucograft® has shown promising results for use as a graft for socket seal in ridge preservation procedures. Its mechanism of action is the creation of a three-dimensional scaffold that allows the ingrowth and repopulation of fibroblasts, blood vessels and epithelium from surrounding tissues, eventually transformed into keratinized tissue. Its limitation of application in periodontal surgery in large scale is due to animal resource and controversially studies in vitro and in vivo.

Moreover, cell growth and effective diffusion of nutrients and oxygen are not restricted to the scaffold surface but take place throughout the entire scaffold. In such modular scaffold systems, strength, biodegradation rate, and biological functions can be controlled by varying the type, composition, fiber diameter, porosity, number, and sequence of the individual layers. The CGN/PCL multilayer biocomposites can be cut into any desired scaffold shape and attached to tissue by surgical sutures in order to suit the needs of individual patients. This technology was developed originally in laboratory research by Prof. Dr Steinberg in Freiburg University, Germany and manufactory research furtherly was developed by Amor Medical Sci-Tech Co., Ltd. Suzhou, China. Nevertheless, largely researches of cellar and molecular level and soft tissue regeneration in vivo are required for NBMs as a new scaffold transfer to application in clinical therapy of periodontology and implantology near future.