

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

An antibacterial wound dressings were successfully prepared using two technique i.e. solvent casting process and gamma radiation. Alginate dressing, incorporating copper was successfully prepared using low pH and 2.0 % w/v of alginate which provided dimensional stability and antibacterial activity. The prepared hydrogels/films provided excellent liquid absorption properties. WVTR information showed the ability to allow water vapor to pass through the film and prevention of agglomeration of exudates that promoted accelerated wound healing. Copper (II) ions can be released from the incorporated film to be an active substance to disinfect bacteria. The antibacterial activity of the prepared films caused bacterial disinfection when using just 1.0 % w/v of copper (II) sulfate. Moreover, the blood clot assay was demonstrated that alginates containing copper (II) ions possibly had the potentiating effect on prothrombotic coagulation and platelet activation. Next, the gamma ray induced the reduction of copper (II) stearate within hydrogel pad to copper nanoparticles. The materials exhibited the good antibacterial activity against *E.coli*, *S. aureus*, *MRSA*, *S. epidermidis*, *S.pyogenes*. The addition of copper (II) stearate was affected to the swelling of the hydrogels. The swelling decreased when concentration of additional copper (II) stearate increased. All of the hydrogel samples had ability to allow water vapor to pass through (in the term of WVTR) which can be used for burn wound. From the results it can be concluded that both materials can possibly be applied for use as an antibacterial wound dressing base on their low-toxicity for skin cells (fibroblasts) and excellent anti- bacterial activity.

An artificial nerve was successfully prepared from the PAA nanofibrous tube using electrospinning process. The obtained PAA tube showed the responsive to ions change in the medium which was clearly showed the cycle of shrinkage and expansion during ions exchange occurred. The rapid responsive of the Na/Ca exchange of the PAA tube was occurred when using physiological salt concentration of the human body (150 mM NaCl) as an immersion medium which can be related to ions influx of an living axon.

The antioxidant scaffold was prepared from gallic acid and collagen-I scaffolds using the amine-reactive-NHS ester solution which provided excellent and stable scavenging activity depending on the usage of GA concentration. The study model of cell activities after applied stress was showed the impressively high cell growth when using GA 20 for HDFa and young MSCs and GA 40 for aged MSCs. Another factor that was affected on the responding of 6 different MSCs patients after exposed to the pyocyanin was the aging of patient. The generation of free radical of aged person was higher than young person that required more scavenging agent to regeneration. Additionally, the cell number of all batches was obtained from DNA count after expose to pyocyanin which directly indicated the same trend as cell proliferation in the less sensitivity manner.

8.2 Recommendations

Copper released from the copper hydrogel (from both materials as mention) kept at room temperature for one year is supposed to determine. Effects of hydrogel storage temperature on the antimicrobial efficacy are suggested to examine. We suggest development of burn wound model creation and examination of wound healing process for wounds treated with the novel copper hydrogels and available antibacterial dressings. We believe that the obtained results will be confirming the clinical use of the material.

An artificial nerve needs to better evaluate the certain amount of absorbed cations on the mimic nerve. The absorptive capacity of other metals is the interesting issue because of the existing of many ions in our body. From the obtained results can better justify the potential to be an artificial nerve of the material.

From scavenging activity of the GA grafted collagen scaffold showed impressive activity. In order to better justify the clinical range need of this material. *In vivo* tested is needed (i.e. animal model and implant to patients)