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PROJECT COMPLETION REPORT

1. **Project Number** : 8143

2. **Title of the Project** : Chitosan/alginate based antioxidant polymeric wound dressings for controlled antibiotic delivery

3. **Funding Agency Name** : TRC, SCTIMST

4. **Project Reference Number provided by the Funding Agency**: 8143

5. **Principal Investigator (Name & Address) : Dr. Rekha M.R.**
   Scientist G, Division of Biosurface Technology, BMT Wing

6. **Co-Investigators (Name & Address):**
   - **i.** Dr. T. V. Anilkumar
     Scientist G, EXPT, BMT Wing
   - **ii.** Dr. Maya Nandakumar A
     Scientist G, MIT, BMT Wing
   - **iii.** Dr. Harikrishnana V.S.
     Scientist F, BMT Wing

7. **Implementing Institution** : SCTIMST

8. **Collaborating Institutions** : None

9. **Date of Commencement** : May 2020

10. **Duration** : Three years

11. **Date of Completion** : June 2020

12. Objectives as approved :

(i) To develop a polymeric wound dressing system for controlled antibiotic delivery and wound healing.

(ii) Polymer with antioxidant property will be developed so that it can be explored further for treating non-healing wounds also.

(iii) To carry out in vitro studies for toxicology and drug delivery properties.

(iv) To carry out in vivo studies as a precursor for product development and clinical studies.

13. Deviation made from original objectives if any, while implementing the project and reasons thereof :

No

14. Field/Experimental work giving full details of summary of methods adopted, data collected supported by necessary tables, charts, diagrams and photographs :

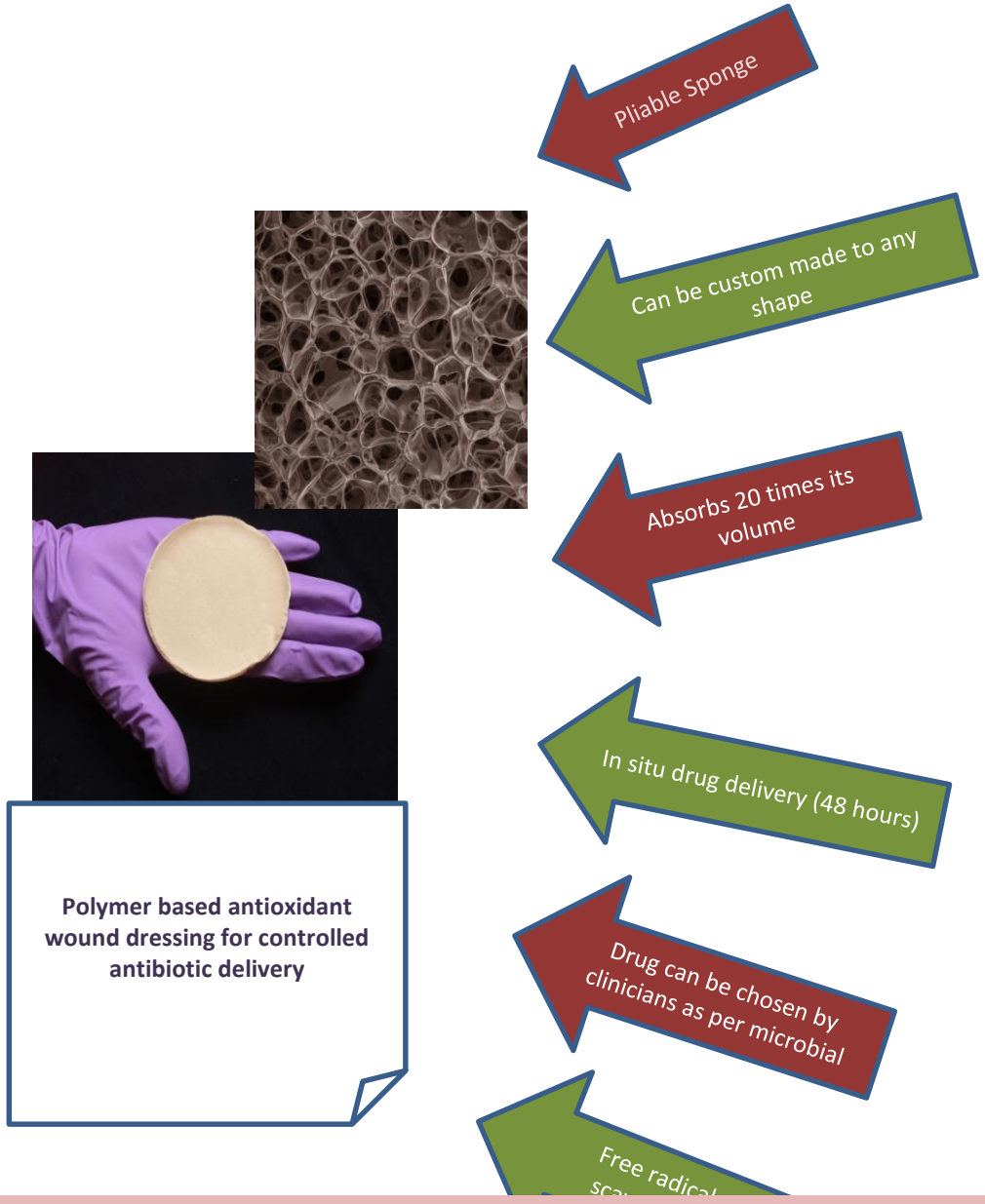
15. Detailed analysis of results :

16. Summary sheet of not more than 2 pages under following heads :
(Title, Introduction, Rationale, Objectives, Methodology, Results, Translational Potential)

Delivering antibiotics to wound is preferred over systemic administration due to reasons such as, higher antibiotic doses are required for achieving efficient therapeutic action at wound site and this often results in adverse side effects such as organ toxicity (1). The use of dressings that can deliver antibiotics to wound sites can provide better wound care as use of lower doses within the dressings reduces the risk of systemic toxicity considerably. The benefits include (i) local delivery can overcome the problem of ineffective systemic antibiotic delivery owing to limited blood circulation at the extremities in conditions such as diabetic foot ulcers. (ii) in non-healing or chronic wounds antibiotics do not reach necrotic tissue which can also be overcome using local delivery via wound dressing. Reports suggest adversely against topical antibiotic applications as it is less effective and can promote multiple drug resistant strains of bacteria. Controlled release of antibiotics to a wound site can prolong the action of the active drug over a period of time by allowing continual release from a polymeric dosage form. From the recent literature it is understood that hydrophilic polymers forms a good choice for controlled release dressings and offers great promise because of the potential advantages they offer.

In another aspect, one of the major reasons that make chronic wounds difficult to heal is the elevated levels of pH, consequently elevated activity of proteases and free radicals such as

reactive oxygen species (ROS) or reactive nitrogen species (RNOS). Proteases degrade growth factors and newly synthesized components of the extracellular matrix (elastin and collagen) while the elevated levels of free radicals oxidize biomolecules and also persistently activate the inflammatory systems which impairs the healing of chronic wounds (2).



<u>Application Area:</u> For treating Non-Healing Chronic Infected Wounds

<u>USP of this product:</u>

- **Good swelling capacity**
- **Antioxidant property for scavenging excess free reactive oxygen species**
- **Drug of choice can be loaded as per the clinical requirement; loaded drug gets released at wound site, thereby avoiding toxic side effects**

<u>Envisaged impact:</u> Affordable advanced wound care biomaterial for a wider population

17. Contributions made towards increasing the state of knowledge in the subject :

18. Conclusions summarising the achievements and indication of scope for future work :

19. Science and Technology benefits accrued :

a. List of research publications with complete details :

1. Rajalekshmy GP, Rekha MR, Strontium ion cross-linked alginate-g-poly (PEGMA) xerogels for wound healing applications: in vitro studies, Carbohydrate Polymers, 251, 2021, 117119 **(I.F: 10.723)**

b. Manpower trained on the project :

i. Research Scientists or Research Fellows : Two
ii. No. of PhD's produced : One
iii. Other Technical Personnel trained : One

c. Patents taken, if any : Filed one
d. Products developed, if any : One

20. Abstract: (In 300 words for possible publication in ..... Bulletin)

a. Background:

b. Materials:

c. Results:

d. Conclusion:

21. Procurement/Usage of Equipment:

a. Details of Equipment:

Sl. No.	Name of Equipment	Make/ Model	Cost (Rs.)	Date of Installation	Utilisation	Remarks regarding maintenance breakdown

b. Suggestions for disposal of equipment(s):

Dr. REKHA M.R.
(Name and Signature of PIs with date)

Routing: *Signed copy of "Project completion Report" by PI → root@sctimst.ac.in, rpc@sctimst.ac.in*