Source : www.thehindu.com Date : 2022-05-15

BIOMATERIAL FROM FUNGAL EXTRACT HELPS HEAL WOUNDS

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

A wound on mice got disinfected by applying the material and also the healing was faster. | Photo Credit: Getty Images

The use of antibiotics to control bacterial infections has taken a beating with the emergence of multi-drug resistant pathogens, and researchers are looking to develop other ways of tackling such bacterial infections. In this context scientists have developed a new biomaterial that can be used to disinfect wounds and hastens the process of healing, as seen in mouse models.

Reported in a paper in the journal *Biomaterials Science*, the work is a collaboration between scientists from Indian Institute of Technology (IIT) Mandi, IIT Delhi and National Institute of Science Education and Research (NISER) in Bhubaneswar

The biomaterial is derived from the polymer pullulan which is secreted by the fungus *Aureobasidium pullulans*. It is an exopolysaccharide, that is, this polymer is secreted by the fungus itself into the medium on which it is growing.

“We, as a research group, have a special interest and expertise in exploiting the varied properties of natural polymers for biomedical applications,” says Dr. Amit Jaiswal from IIT Mandi, who is an author of the paper.

Pullulan as a biomaterial is already successful and widely used commercially. It is exploited in food, cosmetics and pharmaceutical industry because of its non-toxic, non-mutagenic and non-immunogenic properties. Further, its ease of manufacture has also added to its appeal.

Dr. Jaiswal says that while in the biomedicine sector, it has been used for drug and gene delivery, its use as a antimicrobial biomaterial had not been explored, and that was what got the group working on this aspect.

Pullulan is basically a polymeric chain of glucose. “By keeping the biocompatible carbohydrate backbone of the polymer intact, we introduced some quaternary ammonium groups into the polymer to make it positively charged,” says Dr. Jaiswal.

They process the polymer to get a powder which is water-soluble. This solution can be applied on the wound surface and then covered with a sterile gauze. This can also be used in a gel form. “We believe the best approach will be to design hydrogel-based wound dressings using this biomaterial,” he says.

This is because hydrogels have an inherent ability to accelerate wound healing by providing a closed and moist environment to the wounds for easy exchange of oxygen and act as absorbent pad to remove the pus and debris. “We are currently working towards this goal,” he says.

The group tested the efficacy of the material by applying it directly on to a full-thickness wound on mice. They found that the wounds got disinfected and also the healing was faster.

The material could cause a 100% closure of wounds within 12 days, while in the absence of application of the material, closure was only 60%. According to the researchers, within seven

days, a thick neo-epithelial layer was formed well connected to wound edges along with hair follicles. A completely healed skin with more hair follicles under the epithelial layer and densely packed collagen was observed by day 12.

“Right now, we are developing antibacterial coatings for medical implants using this material. Testing in animal models to test the efficacy of these coatings is underway,” says Dr. Jaiswal.

“We believe the best approach will be to design hydrogel-based wound dressings using this biomaterial”Dr. Amit Jaiswal

Our code of editorial values

END