HIGHLY EFFECTIVE HEALING ANTISEPTIC DRESSING

Description
The healing antiseptic dressing is a safe material developed as an alternative to antibiotics and chemicals for wound repair and wound infection treatment, including antibiotic resistant infections. Antibiotic resistance is a challenge in clinical medicine of the 21st century and alternative methods are required to fight against infection.

At the Institute of Strength Physics and Materials Science (Siberian Branch of RAS), a new class of advanced effective nontoxic (sorption) healing antiseptics has been developed for wound repair and wound infection treatment without resort to antibiotics.

Unlike toxic treatment with antibiotics and/or chemicals, the treatment with the developed material is based on a safe physical mechanism of wound healing. Microorganisms and wound discharge are irreversibly evacuated by electropositive sorption from the wound surface to the bulk of the wound dressing where the microorganisms are immobilized and their growth is inhibited.

![Fig. New healing antiseptic dressing](Image)

Technical specifications
- high sorption efficiency of no less than 99.999% for bacteria and viruses, including pathogenic and antibiotic resistant;
- pronounced hemostatic effect;
- nontoxicity;
- complete prevention of the emergence of resistant bacterial strains;
- effective action up to 7 days;
- fast startup of action within less than 30 min;
- successful results of all necessary tests for toxicity and safety, and preclinical and clinical tests.

New healing antiseptic dressing will allow reducing the wound dressing expenditure, raising the labor productivity due to decreased disability risk by infection, and enhancing the treatment safety due to complication prevention.
### Examples of the effective action of the designed antiseptic dressing

<table>
<thead>
<tr>
<th>Pandactylitis</th>
<th>Recurrent erysipelas</th>
<th>Infected burn, III B degree (Pseudomonas aeruginosa)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient:</strong> man of age 23</td>
<td><strong>Patient:</strong> women of age 90</td>
<td><strong>Patient:</strong> man of age 26</td>
</tr>
<tr>
<td><strong>Prognosis:</strong> thumb amputation</td>
<td><strong>Prognosis:</strong> unfavorable for healing</td>
<td><strong>Prognosis:</strong> treatment for 180 days</td>
</tr>
<tr>
<td><strong>Result:</strong> abandoned amputation, complete healing, disability prevention</td>
<td><strong>Result:</strong> healing to 95%, pain elimination</td>
<td><strong>Result:</strong> abandoned skin transplantation, accelerated healing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Before treatment</th>
<th>Before treatment</th>
<th>Before treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Before treatment image" /></td>
<td><img src="image2" alt="Before treatment image" /></td>
<td><img src="image3" alt="Before treatment image" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>After 48 h</th>
<th>After 6 days</th>
<th>After 12 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="After 48 h image" /></td>
<td><img src="image5" alt="After 6 days image" /></td>
<td><img src="image6" alt="After 12 days image" /></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>After 8 days</th>
<th>After 12 days</th>
<th>After 60 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7" alt="After 8 days image" /></td>
<td><img src="image8" alt="After 12 days image" /></td>
<td><img src="image9" alt="After 60 days image" /></td>
</tr>
</tbody>
</table>

### Technical appraisal and economic benefits

The developed antiseptic material, being nontoxic at all stages of wound healing, excels the best advanced foreign analogues in effectiveness of its action on microorganisms, including resistant strains. The material has a wide action spectrum, effectively removes microorganisms, gives no rise to resistant strains, and reduces the treatment period and costs.

Research shows that the antiseptic dressing material:
- shortens the time of parenchymatous bleeding;
- produces a positive effect on skin flap wound healing, accelerates wound healing, increases the percentage of complete wound epithelization;
- reveals more perfect organotypic differentiation of epidermis and accelerates granulation tissue.
maturation;
  – offers advantages in wound healing parameters such as necrosis, edema, exudation, purulent discharge, and odor;
  – produces nonspecific antibacterial and antymycotic effects on several tens of bacterial cultures, including *Staphylococcus aureus* P-209 and 8538-r, *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Candida albicans*, etc.;
  – demonstrates pronounced viricidal effect on coliphage MS-2 (MS-2 strain PH-1505 with suppressible culture *E.coli* K12 KS507 strain 3254 F+Str-r);
  – demonstrates *Staphylococcus* adsorption of 99.99 % and *Escherichia coli* adsorption of 100 % in 60 min; within 6 h, the microorganism concentration (*Pseudomonas aeruginosa*, *Staphylococcus*) decreases to zero.

**Application areas**

**Surgery**
Highly effective treatment of chronic (venous and diabetic ulcers, decubitus ulcers) and acute septic wounds, burns, wound infections, donor and recipient grafts in skin grafting.

**Dentistry**
Dental strips for treatment of inflammatory infectious diseases of tunica mucosa oris and parodentium.

**Hygienic and sanitary products**
Medical masks, antiseptic plasters, sanitary towels, diapers, etc.

**Development stage**
Initial stage of production.

**Patent situation**
Two patents of the Russian Federation (2010), Russian patent application (2009), international patent application (PCT procedure). According to patent research, no similar application has been made. The time advantage over potential competitors in the subject domain is 5–7 years.

**Commercial offers**
Promotion and sales of the material in the home and international markets. Distribution agreement, sales agreement.

**Estimated cost**
Contract price.

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