



STARCH – HYALURONIC ACID BASED STAPLE MICROFIBERS FOR WOUND DRESSINGS

INVENTORS

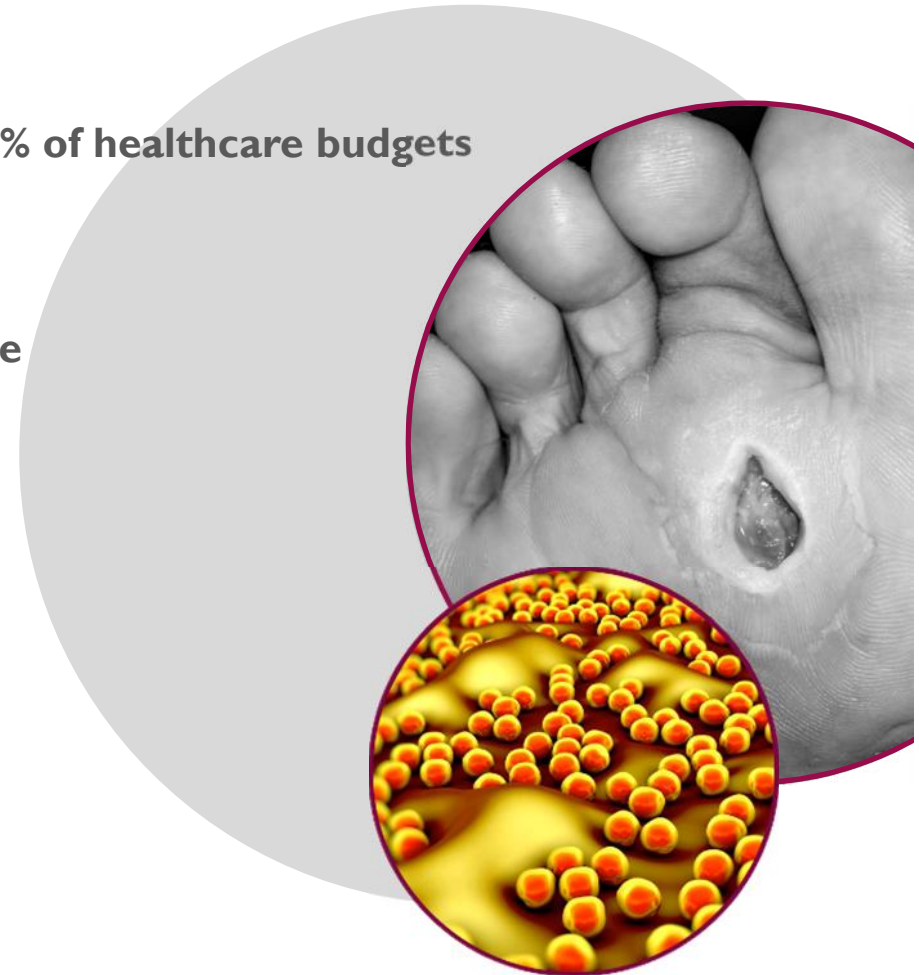
prof. Radim Hrdina & assoc. prof. Ladislav Burgert
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COMMERCIALIZATION CONTACT

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Challenges

- **Non-healing wounds**
 - worldwide problem accounting for **2 - 4% of healthcare budgets**
- **Complex of hyaluronic acid and iodine**
 - excellent healing properties, but **unstable**
- **Starch or amylose**
 - **difficult** to prepare the fibers



Technology

- non-woven material based on **staple microfibers of starch and hyaluronic acid** produced by wet spinning technology (non-stationary coagulation bath)
- **antimicrobial version with iodine** without the loss of activity due to sublimation or chemical reactions
- **increased shelf life** of the product ensured
- **biocompatible and biodegradable** components
- enhanced mechanical properties
- suitable for dermal and surgical application



Material properties

Fiber diameter

200 nm - 15 μ m

(according to the customer needs)

Surface weight

10 - 30 g/m²

Fiber length

0.5 - 10 cm

(optimum 3 cm)

Sample size

11 x 11 cm

Iodine incorporated

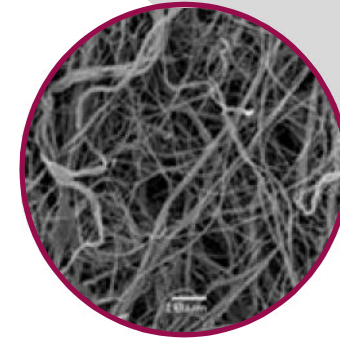
5 – 10% wt. – complex iodine + amylose

Bacteriostatic properties approved

(Klebsiella pneumoniae, Pseudomonas aeruginosa, Escherichia coli, Candida albicans, Staphylococcus aureus)

Stability over time

2 years



Wound cover variants

1-layer (mono layer) non-woven fabric (fiber-forming polysaccharides + starch + iodine)

Fiber-forming polysaccharides can be hyaluronic acid (1.7 MDa), oxycellulose, carboxymethylcellulose etc.

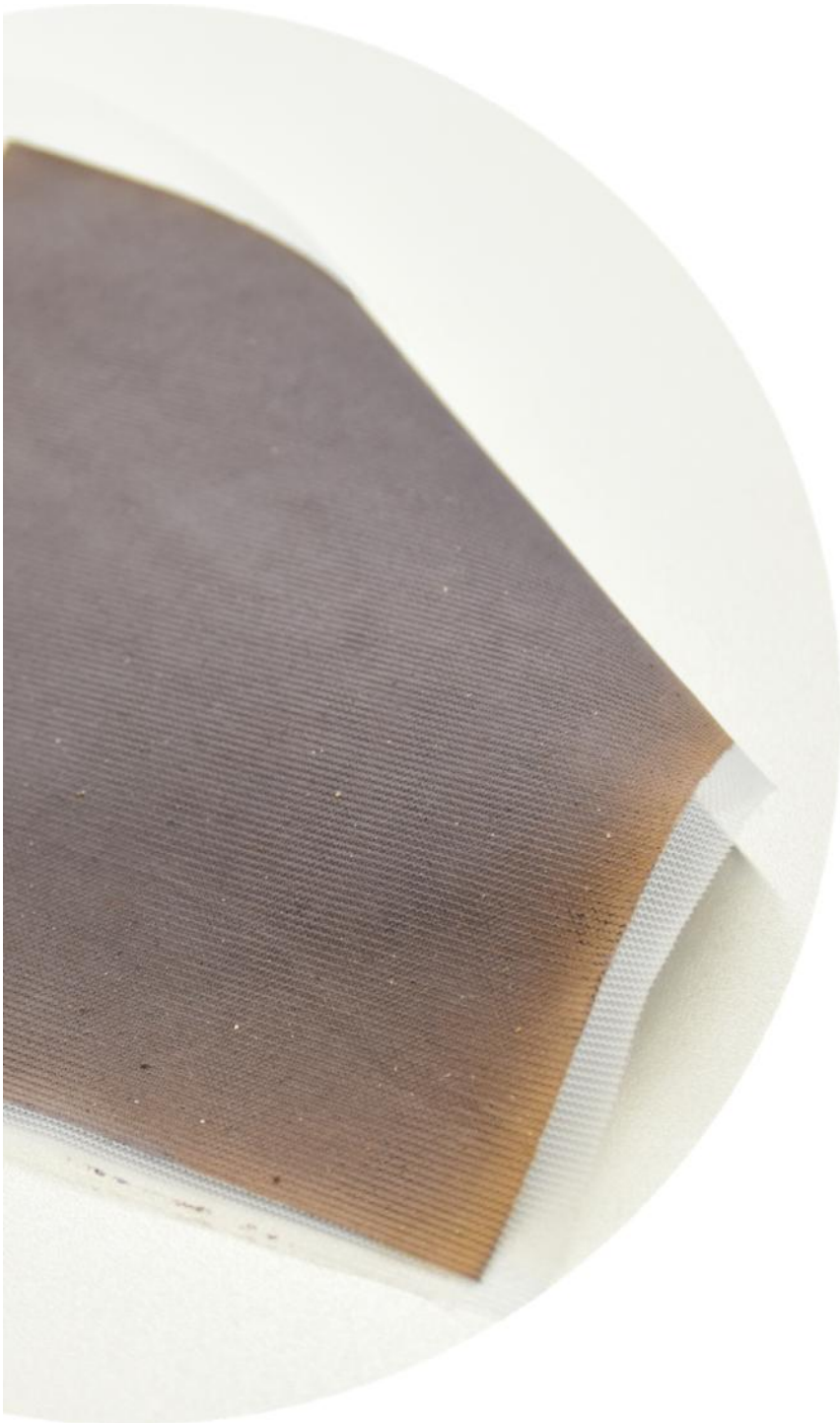


2-layers or 3-layers (non-woven layer combined with conventional fabric of natural or synthetic polymers and preferably hydrophobic interlayer)

Conventional fabric can be natural polymers (cellulose and its modified variants, viscose silk) or synthetic polymers (polyamide, polyester, polypropylene or polylactide which is biodegradable in the human body).

Interlayer can be polypropylene, polylactide, polyglycolic acid.





Development status

Laboratory manufacturing process developed in collaboration with a Czech biotech company Contipro a.s.

IP rights fully owned by University of Pardubice.

HA-starch based non-woven fabric.

Multi-layer variants with conventional fabric possible.

In vitro **agar diffusion test**.

Stability over time tested.

Tensile testing performed.

Research team

Project principal investigator:

prof. Radim Hrdina



Project co-workers:

assoc. prof. Ladislav
Burgert, CSc.

Preparation of staple microfibres

assoc. prof. Tomas
Weidlich, Ph.D.

Biochemical degradability

assoc. prof. Iveta
Brozkova, Ph.D.

Antimicrobial tests and mechanism of
action

assoc. prof. Anna
Krejцова, Ph.D.

Analytics

assoc. prof. Vladimir
Velebny

Wound cover design

Veronika Štěpánková

Wound cover design

Further development

Work package

Outputs

1. Biocompatibility evaluation (ISO 10993)



cytotoxicity; skin irritation; skin sensitization tests

Use of International Standard ISO 10993-1, Guidance for Industry and Food and Drug Administration Staff Document issued on: June 16, 2016

2. *In vitro* assessment of antimicrobial properties



Multispecies biofilm in an artificial wound bed.

<http://dx.doi.org/10.1016/j.mimet.2014.05.008>

Biomedical Center of the Faculty of Medicine in Pilsen

3. *In vivo* assessment in animal models



Model of healing of cutaneous wounds in non-diabetic and diabetic rats.

Porcine model of healing of full-thickness cutaneous wounds experimentally infected with bacterial biofilm.

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