

Chronic wounds: current and future therapy options

Dr. Roxane Schulten



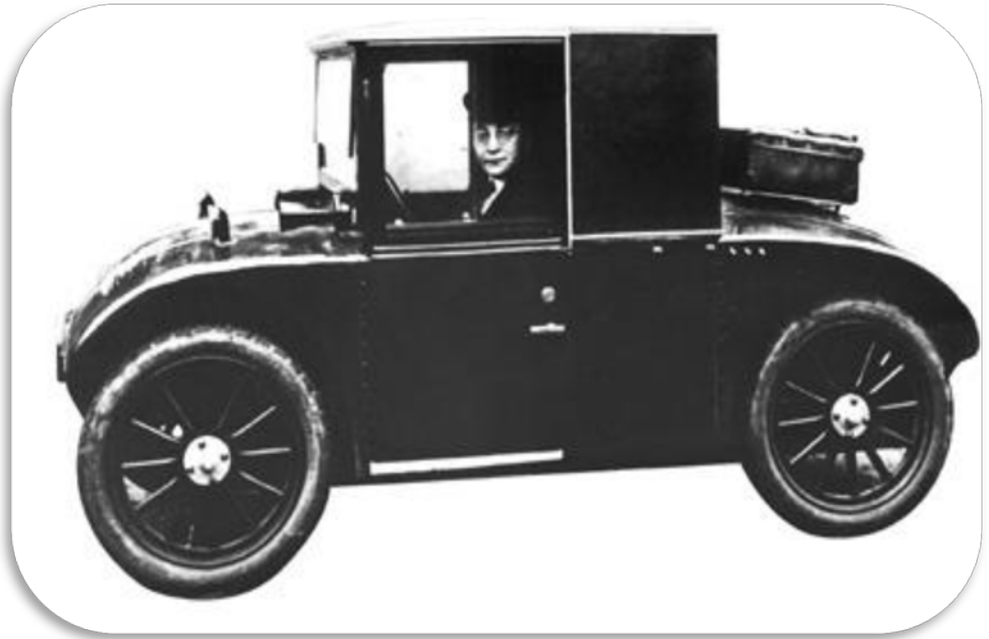
PIRATOPLAST®

Dr. Ausbüttel®

Dr. Ausbüttel & Co. GmbH established in 1923



Dr. Julius Ausbüttel



PIRATOPLAST®

Dr. Ausbüttel®

Wound care in history

Egyptians, Greek, Romans

- Honey
- Grease
- Lint
- Vinegar
- Wine
- Bandages



PIRATOPLAST®

Dr. Ausbüttel®

Wound care in history

Middle Ages, Renaissance

- Loss of ancient knowledge
- „laudable pus“, mainly by *Staphylococcus*
- High mortality caused by infection and insufficient treatment



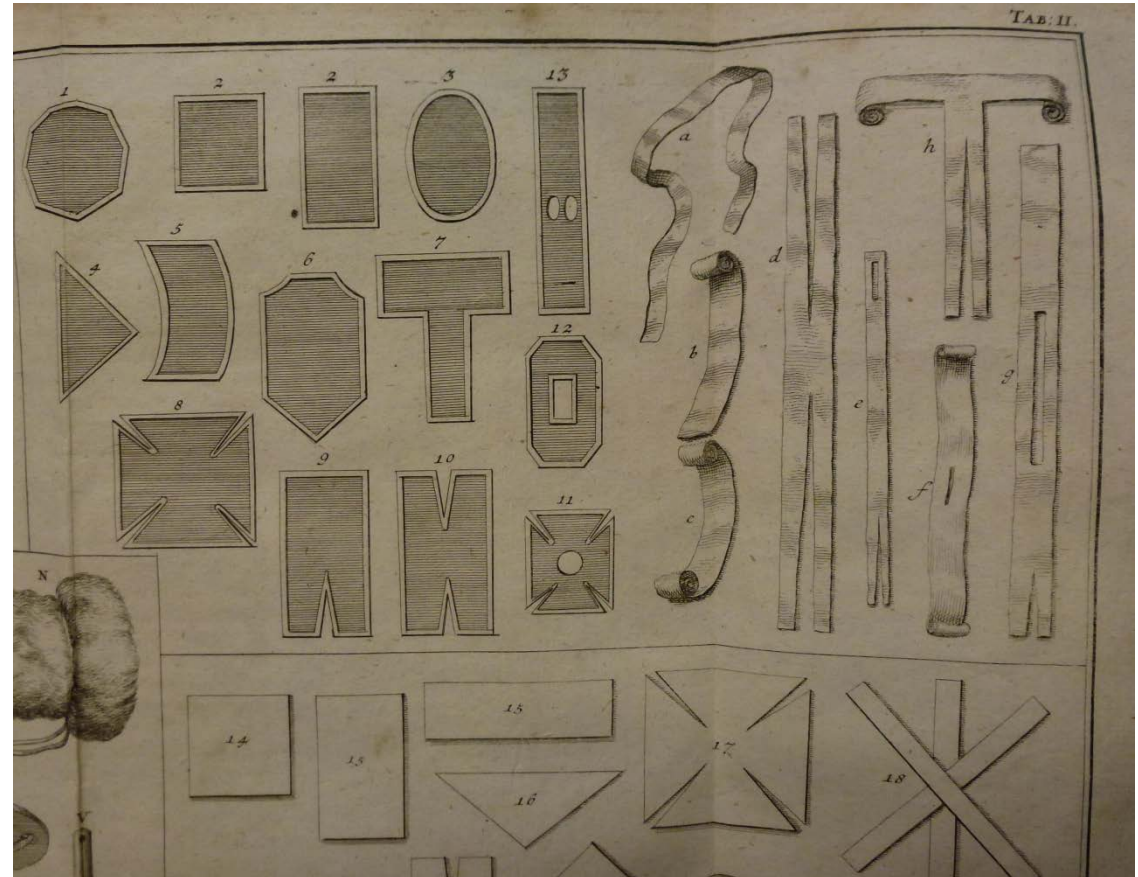
Adriaen Brouwer, ca. 1633



PIRATOPLAST®

Dr. Ausbüttel®

Wound care in history



Lorenz Heister, ca. 1749



PIRATOPLAST®

Dr. Ausbüttel®

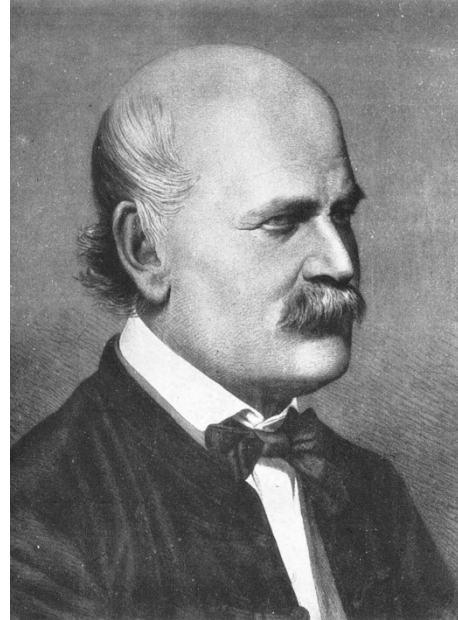
Wound care in history

19th century

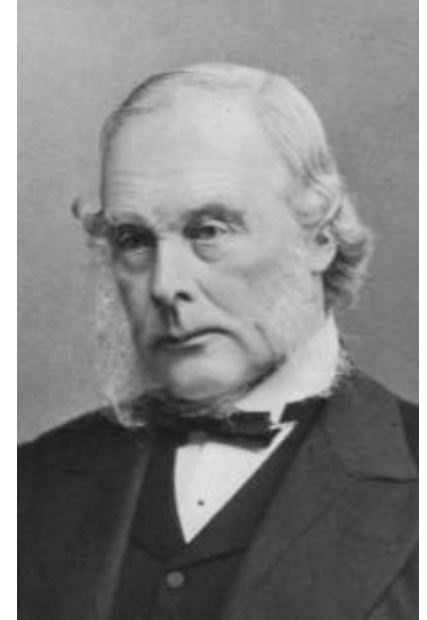
- Connection of infection and bacteria
- „Sterile“ procedures in rooms and surgery

20th century

- Alexander Fleming discovers Penicillin (1928)



I. Semmelweis



J. Lister



PIRATOPLAST®

Dr. Ausbüttel®

Wound healing phases



Exudation

Granulation

Epithelization

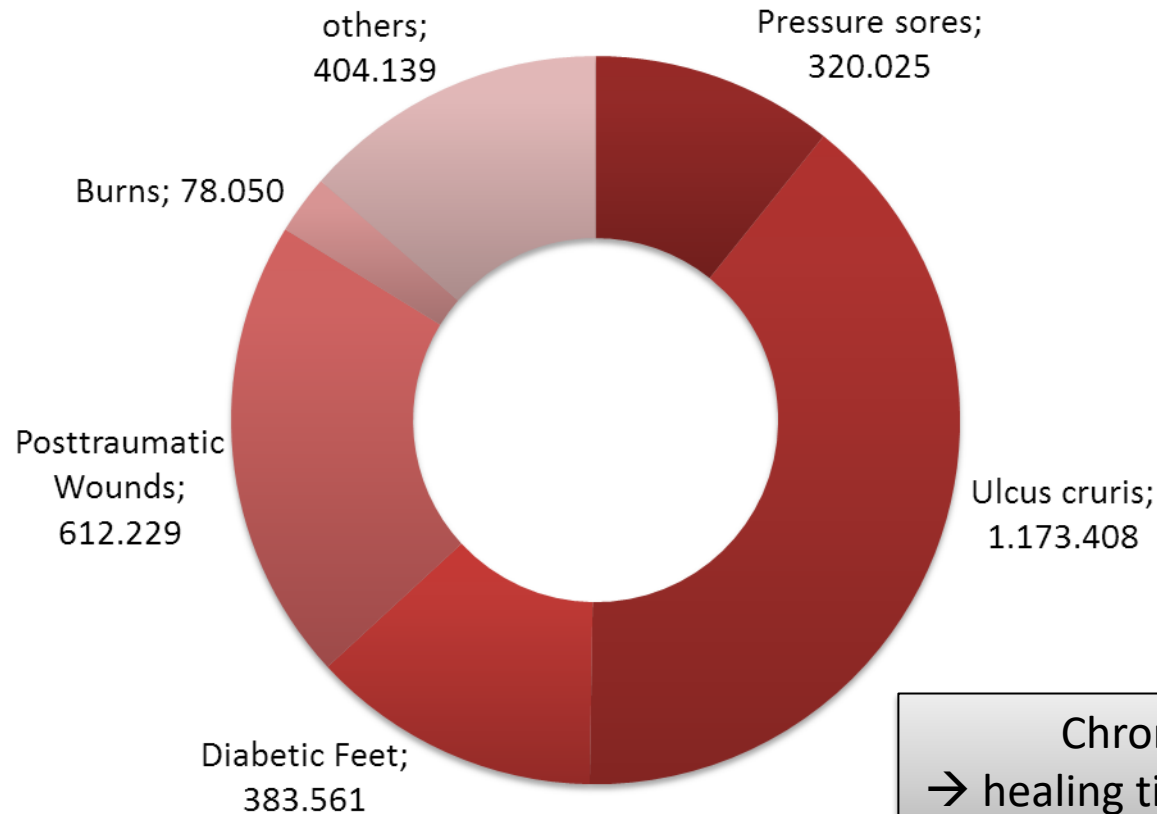
time



PIRATOPLAST®

Dr. Ausbüttel®

Chronic wounds in Germany



Chronic wound
→ healing time > 8-12 weeks

Epidemiologie und Versorgung von Patienten mit chronischen Wunden. Eine Analyse auf der Basis der Versichertenstichprobe AOK Hessen/KV Hessen
3. Dezember 2015



PIRATOPLAST®

Dr. Ausbüttel®

Wound care treatment

Before 1970's

After 1970's



„dry“



„moist“

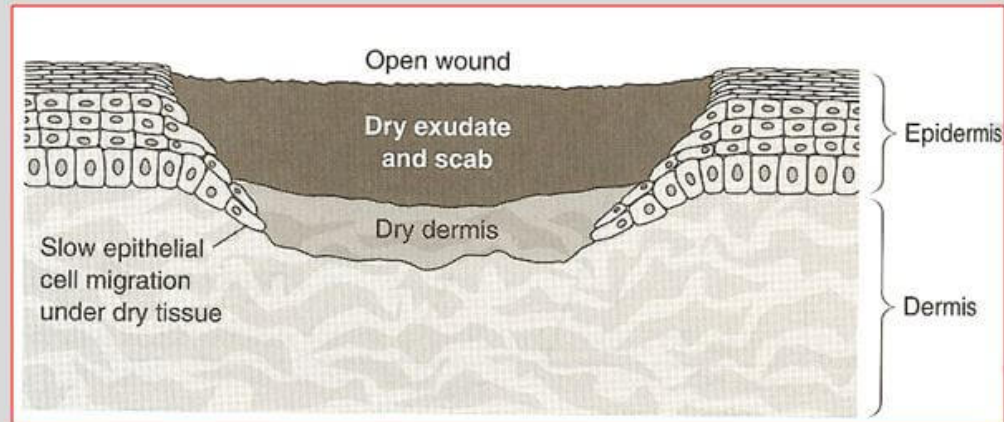


PIRATOPLAST®

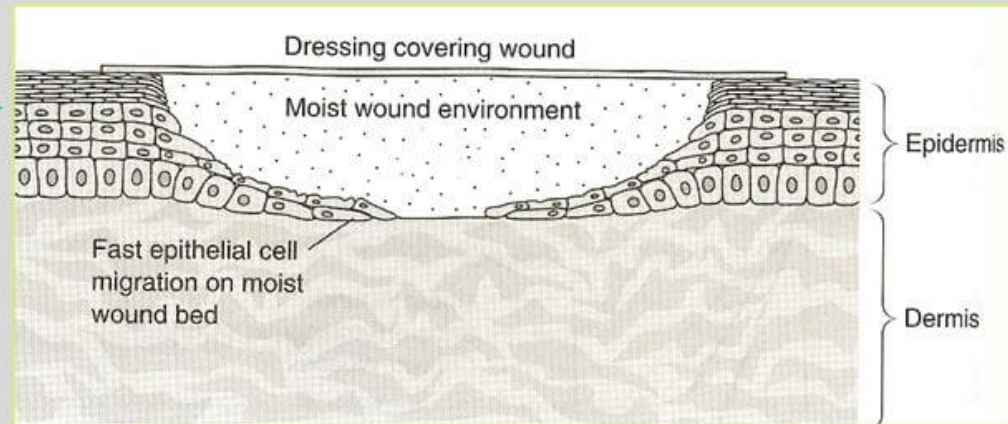
Dr. Ausböttel®

Wound care treatment

DRY ►



MOIST ►



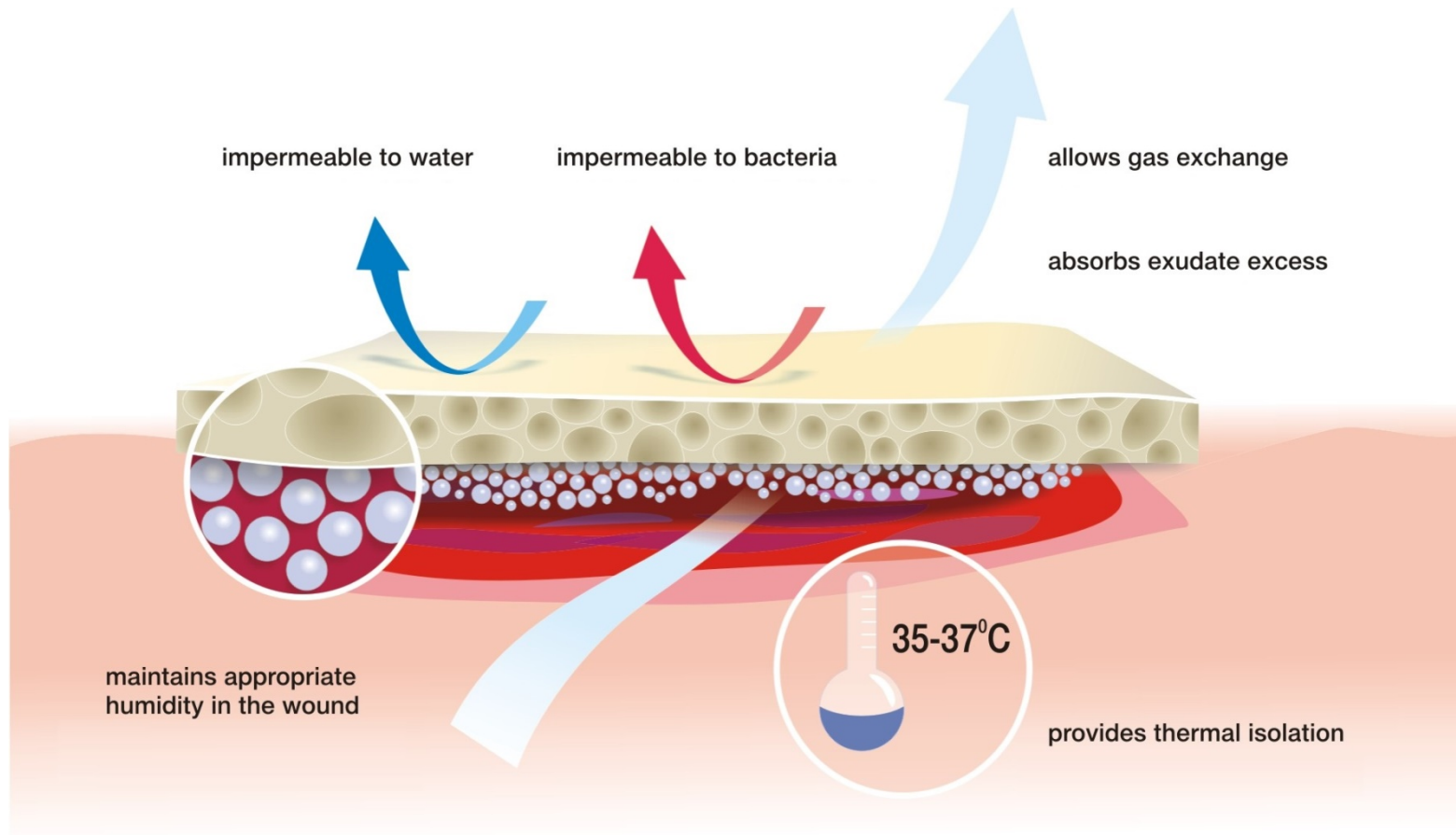
<https://www.wcei.net/>



PIRATOPLAST®

Dr. Ausböttel®

Benefits of modern wound care products



PIRATOPLAST®

Dr. Ausbüttel®

What wound dressings can do ... and what not.

- Support healing
- Reduce pain
- Less dressing changes
- exudate and odour management



- One-for-all
- Heal wound instantly
- Give information about wound status
- Help in decision making



PIRATOPLAST®

Dr. Ausbüttel®

Chronic wounds in Germany



PIRATOPLAST®

Dr. Ausböttel®

Some of our products



PIRATOPLAST®

Dr. Ausbüttel®

Innovative and future ideas

Wound dressing 4.0

- Improve healing of the wound
- Improve monitoring of the wound
- Improve diagnosis of wound situation

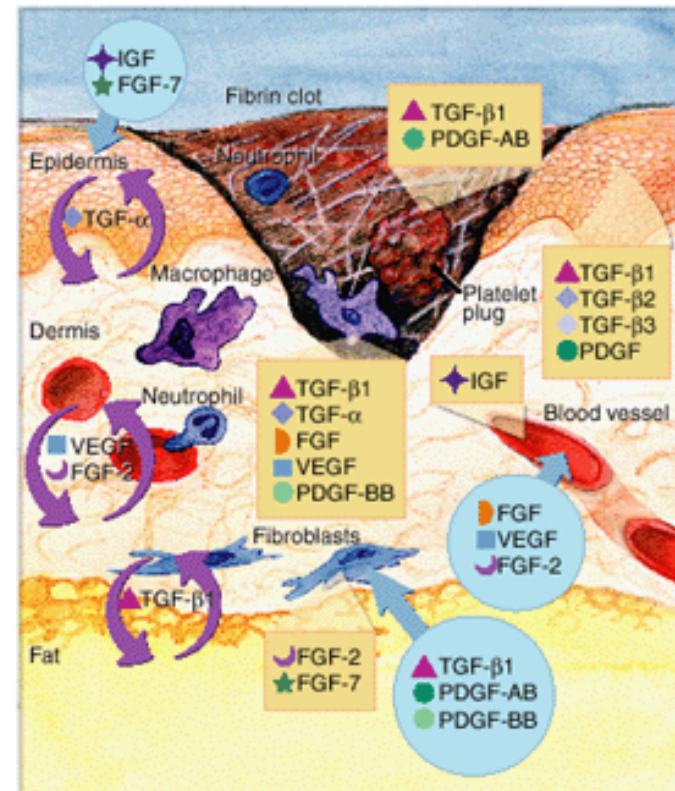


PIRATOPLAST®

Improve wound healing

Biological factors:

- Proteases $\uparrow\downarrow$
- Growth factors
- Extracellular matrix
- Stem cells
- ...



Singer et al., 1999



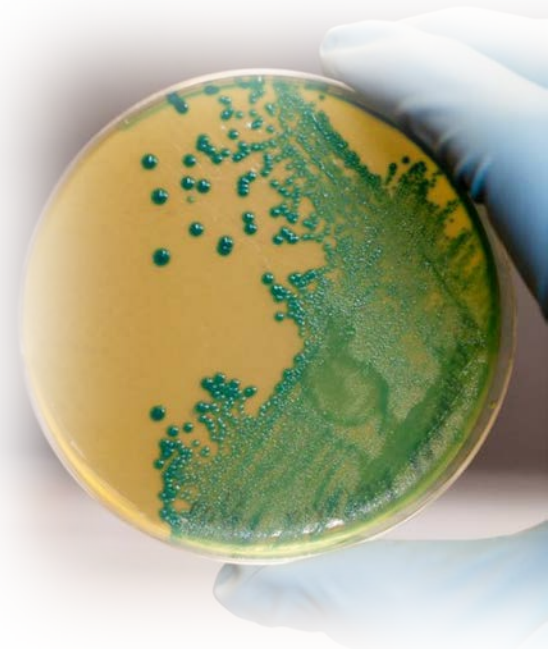
PIRATOPLAST®

Dr. Ausbüttel®

Improve wound healing

pH value

- Wound healing is improved by lower pH values (~ 5.5)
 - Higher value may indicate higher bacterial contamination (> 7)
- Detection of continuous pH value as indicator of bacteria and wound healing

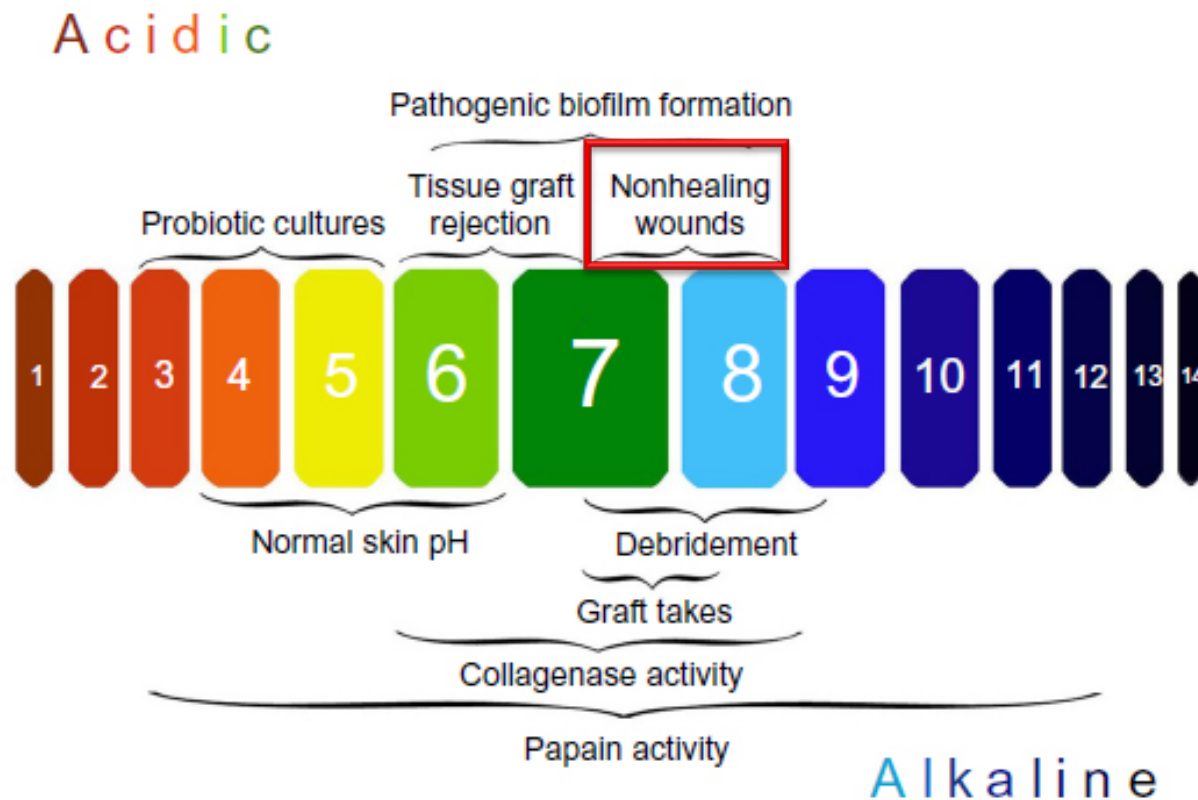


PIRATOPLAST®

Dr. Ausbüttel®

Improve wound healing

pH value



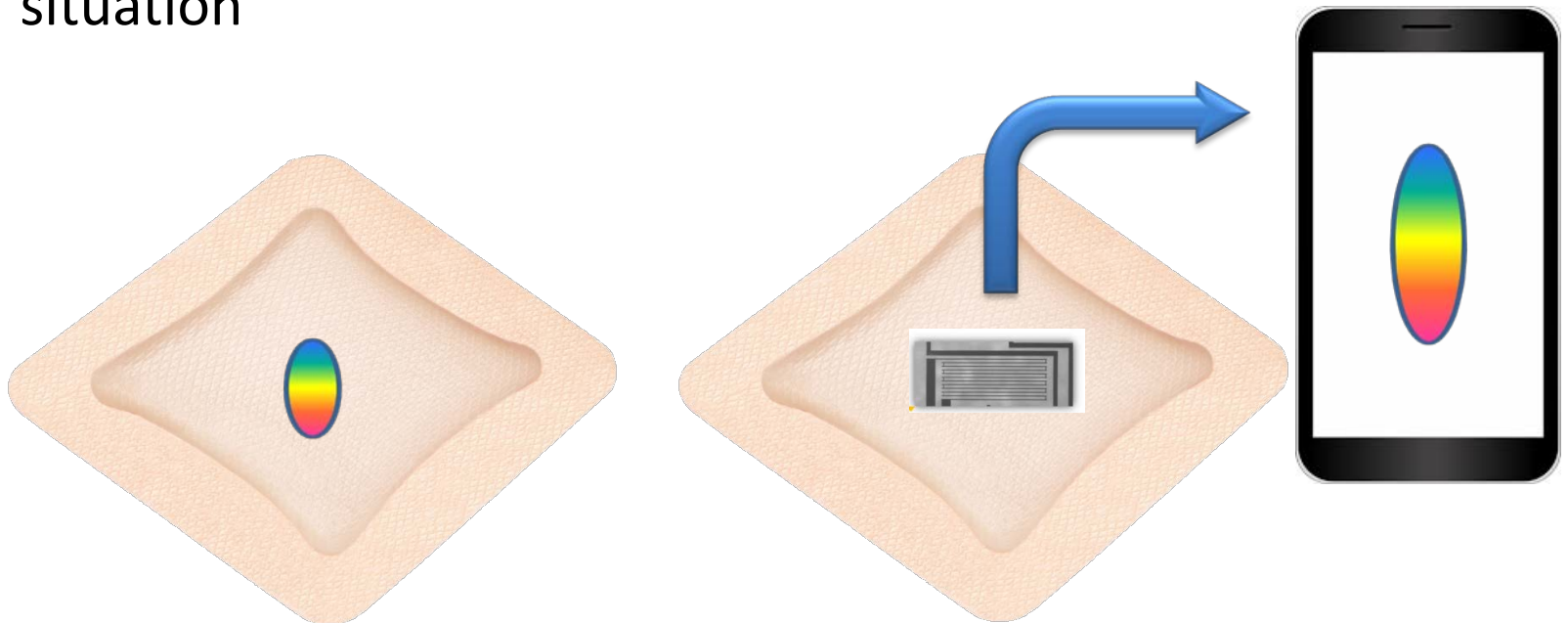
PIRATOPLAST®

Dr. Ausbüttel®

Improve wound healing

pH value

→ Detection of pH value and correlation with wound situation



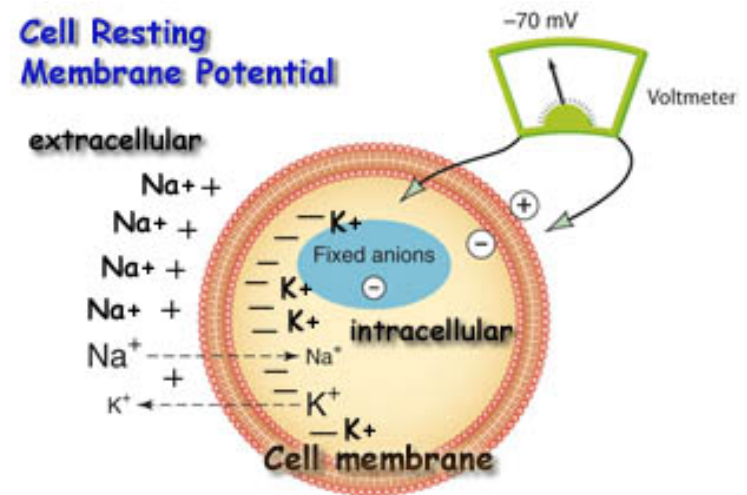
PIRATOPLAST®

Dr. Ausbüttel®

Improve wound healing

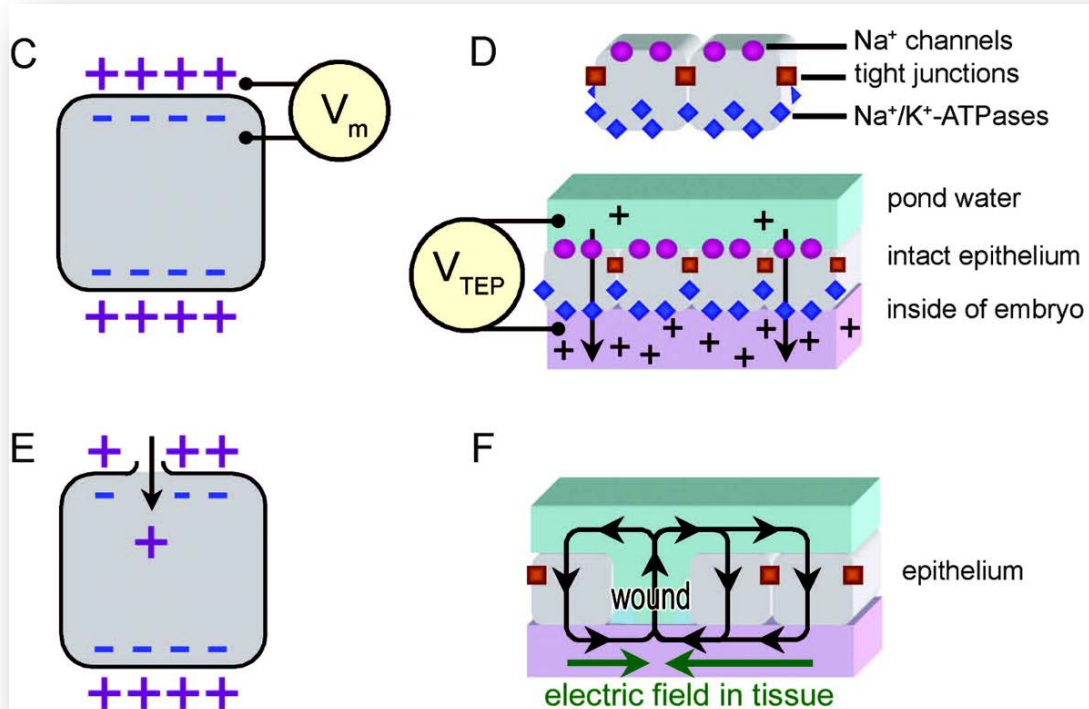
Electric fields

- TEP (transepithelial potential) of -70 mV
- Inside of cells: negatively charged, outside positively → „Biological battery“
- Wounding changes electric field

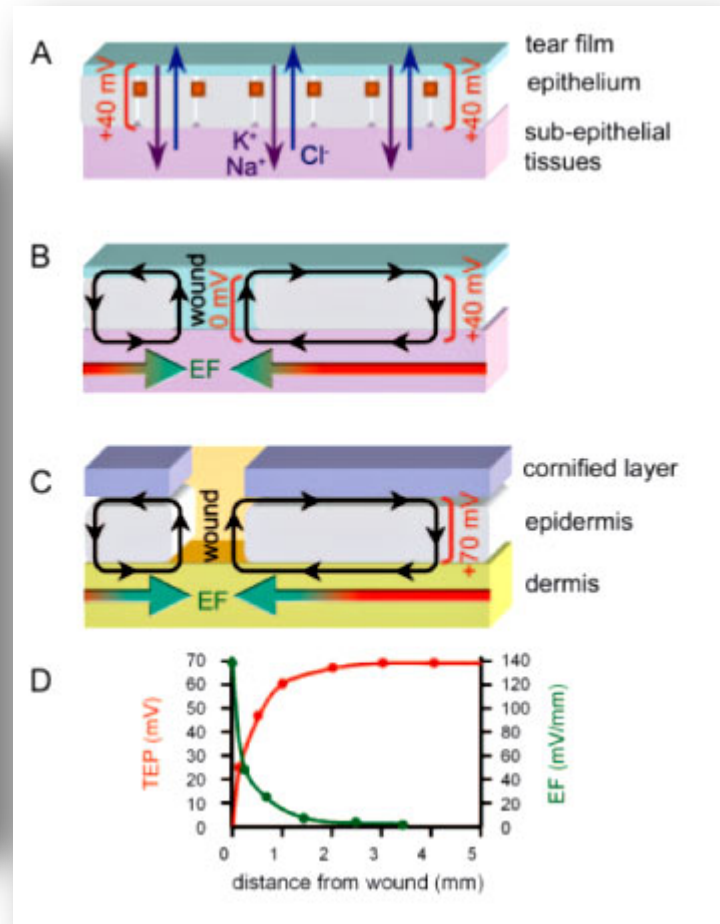


Improve wound healing

Electric fields



McCaig et al., 2005



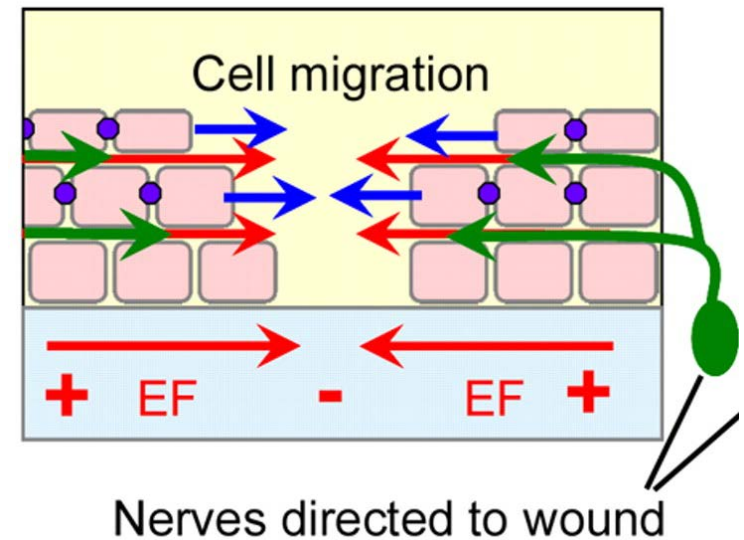
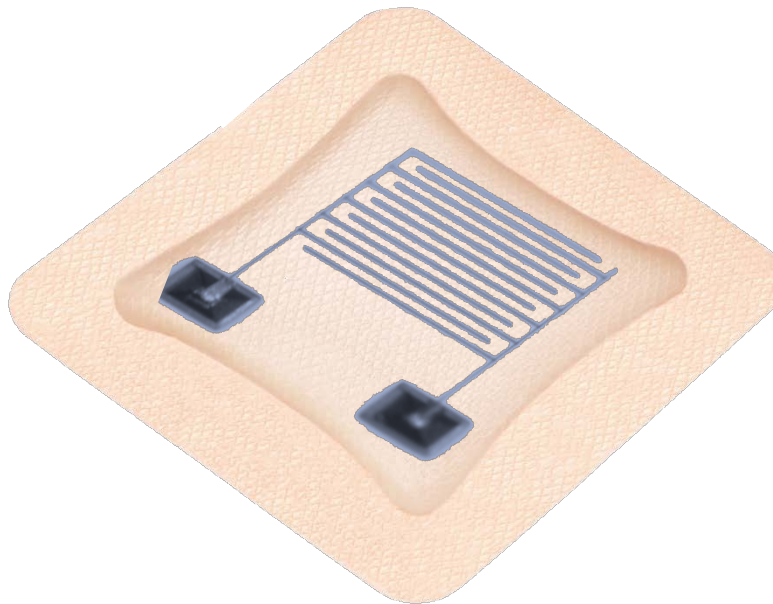
PIRATOPLAST®

Dr. Ausbüttel®

Improve wound healing

Electric fields

- Restore electric field and give stimulus to wound healing



McCaig et al. 2009



PIRATOPLAST®

Dr. Ausbüttel®

Monitoring

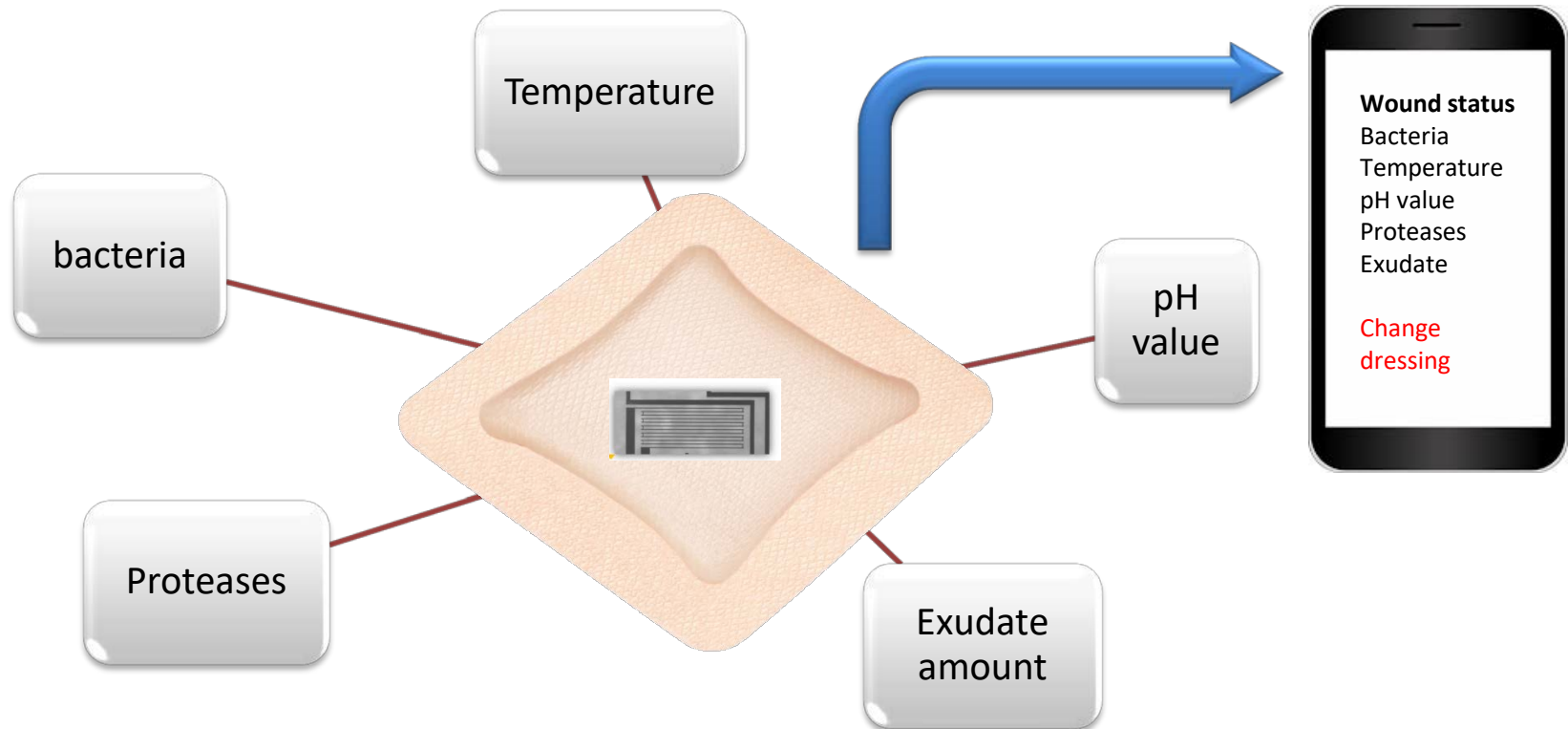
Wound status

- Only to be determined during dressing change
- Insecurity about time of changing
- Fixed interval → higher costs



Monitoring

Wound status



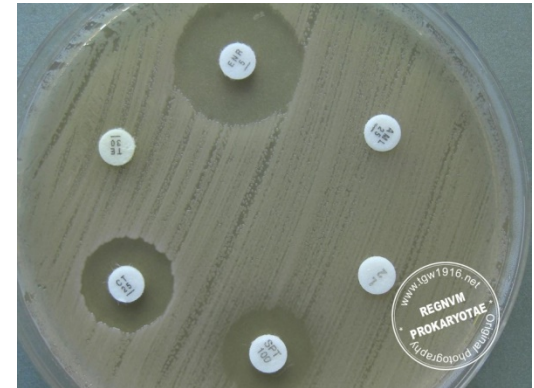
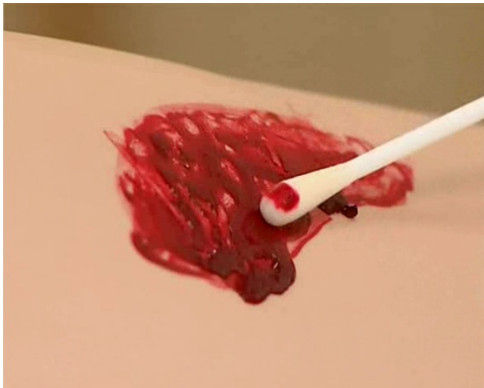
PIRATOPLAST®

Dr. Ausbüttel®

Diagnosis

Infection control

- Swab test, cultivation of bacteria
- Antibigram → time and effort

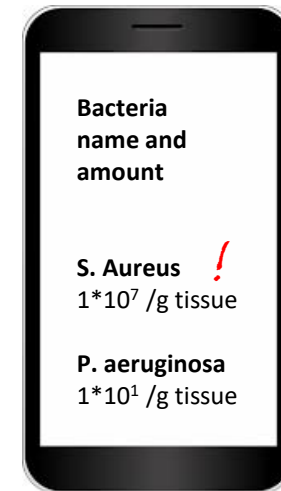
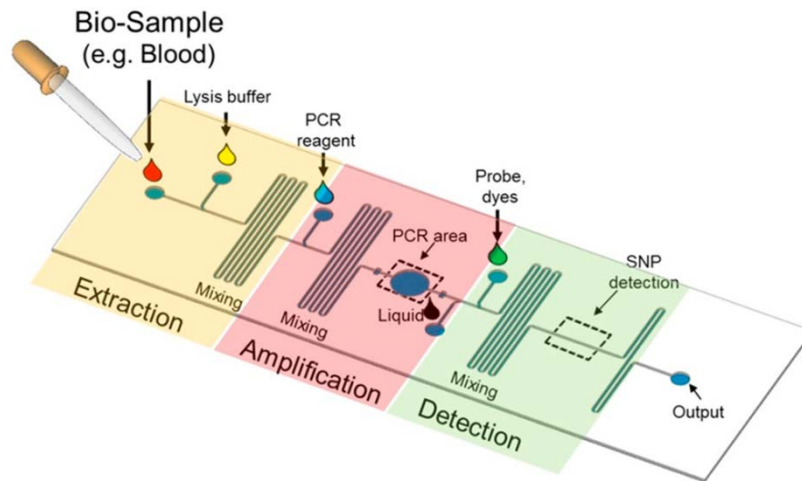


PIRATOPLAST®

Diagnosis

Infection control

- Lab-on-a-chip



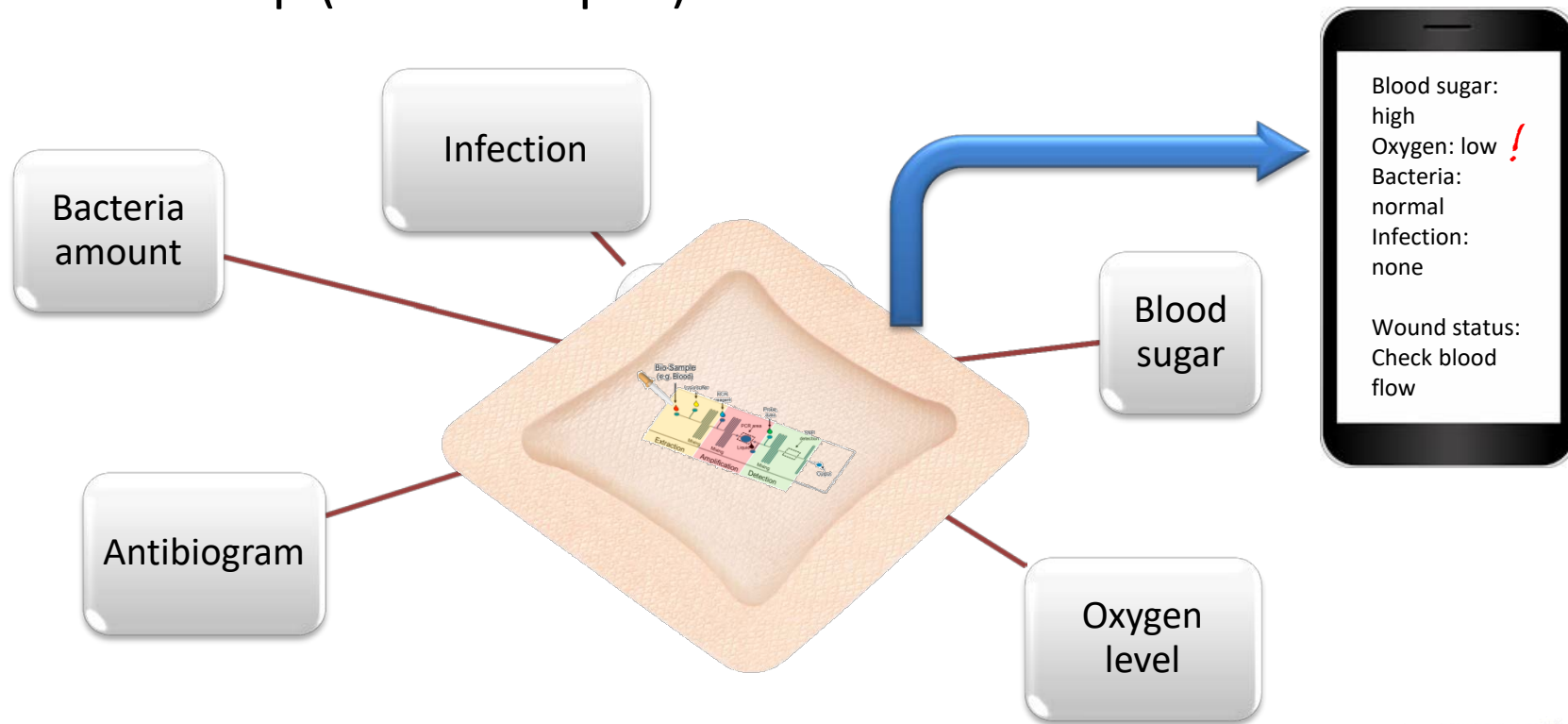
PIRATOPLAST®

Dr. Ausböttel®

Diagnosis

Infection control

- Lab-on-a-chip (in wound pad)



PIRATOPLAST®

Dr. Ausbüttel®

Summary Wounds

- More wounds will have to be treated → older population, growing diseases (Diabetes,...)
- Wound care will shift to more specialized centres with higher technical infrastructure
- Treatment will be more digital and connected
- Costs and reimbursement will be major point for quality of care
- Development needs > 5-10 years (Medical Device Regulation, technical feasibility)



PIRATOPLAST®

Dr. Ausbüttel®

Summary Technology

- Biocompatible small/nano sensors needed
- Fast production in large quantities, easy to handle
- Cheap products → single use
- Wireless connected to mobile devices



PIRATOPLAST®

Thank you

Dr. Ausbüttel & Co. GmbH

Herdecker Straße 9-15

58453 Witten

Telefon: +49 (23 02) 9 56 66- 0

Telefax: +49 (23 02) 9 56 66- 90

E-Mail: info@drausbuettel.de

www.drausbuettel.de

IT'S JUST A FLESH
WOUND!



PIRATOPLAST®

Dr. Ausbüttel®