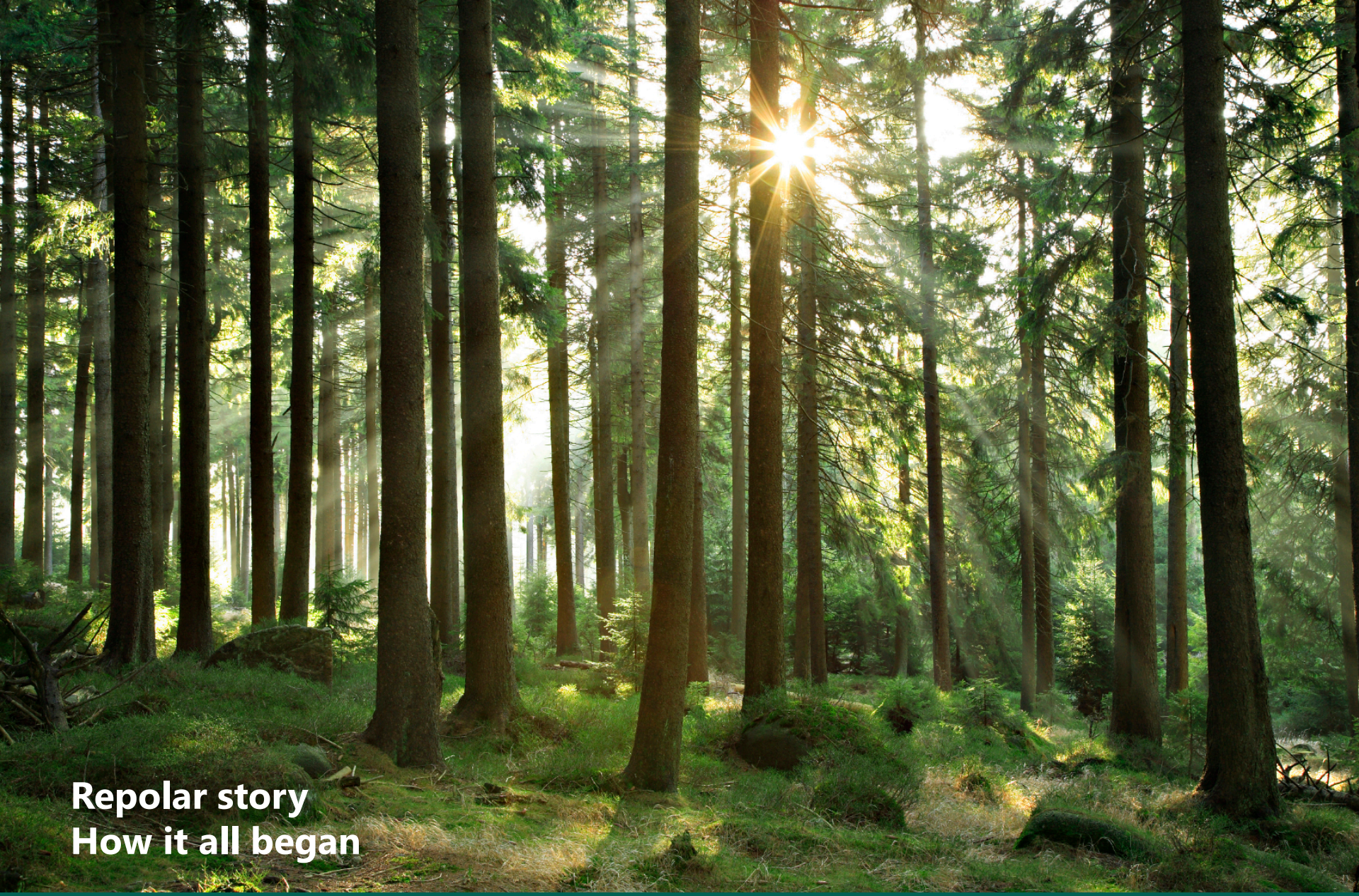
Benefits of tree resin products in human and animal health care
Karelia Symposium April 13, 2021

REPOLAR
PHARMACEUTICALS



REPOLAR
PHARMACEUTICALS

Where did the story begin?

Kolari Health Care Centrum

Helsinki

Why did the story begin?

Norway Spruce Resin wa used for wound healing. Many difficult wounds healed.

Was this all just coincidence?
Are there biological effects in the salve?

Ph.D thesis 2013 University of Helsinki:
Coniferous resin salve, ancient and effective treatment for chronic wounds

Repolar Pharmaceuticals

In brief

- **Who we are**
  - Pioneering company using active ingredients harvested from Norway Spruce –tree.
  - R&D by 3 doctors (MD, PhD); Patented manufacturing processes.
  - We harvest & purify the resin and manufacture the products in Finland
  - We do sales, marketing and distribution in Finland
    - All pharmacies in Finland sell Repolar products
    - Sales to Veterinaries and VET clinics
  - We export the products currently to 10 EU-countries

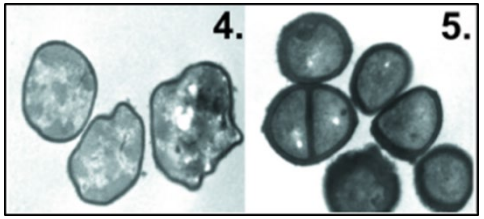
- **What we do**
  - Create innovative CE marked products for treating wounds, cracks and other issues with skin/ears/cavities. Also for infected wounds.
  - Claims on products are backed up by clinical and in vitro tests

REPOLAR
PHARMACEUTICALS

Norway Spruce Resin

Science behind 1/2

Staphylococcus aureus



- **Antimicrobial**
  - Affects cell walls and prevents mitosis and cell energy production (ATP)
  - Thereby strongly antimicrobial against wide range of bacteria and fungi
  - Does not induce resistant microbe strains

- **Anti-Inflammatory**
  - Influences cell cytocines expression in in vitro test
  - Similar affects in in vitro tests than with cortisone (Dexamethasone)

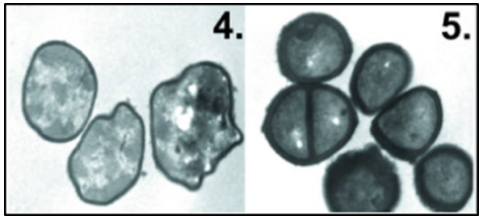
Scientific literature:

- Effects of Norway Spruce (Picea abies) Resin on Cell Wall and Cell Membrane of Staphylococcus aureus. Published in 2009: Ultrastructural Pathology
- Antimicrobial properties of natural coniferous rosin in the European Pharmacopoeia challenge test. Published in 2011: APMIS
- In vitro fungistatic effects of natural coniferous resin from Norway spruce (Picea abies). Published in 2012: Eur J Clin Microbiol Infect
- Effects on LPS induced IL-1b, MMP-3 and TNF-a production in U937 cells. Report 2013. MDBiosciences Ltd, Glasgow, UK

Norway Spruce Resin

Science behind 2/2

Staphylococcus aureus



- **Improves re-repithelisation**
  - Affects cell growth factors in in vitro tests
  - Reduced scar formation due to impact on keloids
  - Heals skin ulcers effectively in clinical trials

- **Eradicates and inhibits formation of biofilms**
  - Similar affect than Flamigel in vitro

Scientific literature:

- Beneficial effect of resin salve in treatment of severe pressure ulcers: a prospective, randomized and controlled multicentre trial. Published in 2008, Br J Dermatol
- Natural coniferous resin salve used to treat complicated surgical wounds: pilot clinical trial on healing and costs. Published in 2012. Int J Dermatol.
- Tests of Abilar salve against microbial biofilm. Report on 28/9/2015-1. Gent University, Belgium

Norway Spruce wound Balm

How to use

- Wash and clean the wound according to normal woundcare practices
- Apply thin (1-2mm) layer to the wound or to the dressing
- Cover wound with dressing suitable for the wound - Expensive Ag or other antimicrobial dressings are not needed
- Wound treatment and re-apply daily

Diabetic ulcer treated with Abilar 10%

Day 1

Day 6

Indications

What kind of wounds can be treated?

Good results on VET market

Wound type	Benefit to traditional method
✓ Acute day-to-day wounds ✓ Burns ✓ Leg ulcers ✓ Deep wounds ✓ Fungal infections ✓ Necrotic wounds ✓ Complicated surgical wounds ✓ Diabetic wounds	✓ Prevents wound from infecting ✓ Reduces scar formation ✓ Promotes epithelisation ✓ Easy to apply ✓ Widely antimicrobial ✓ Cleans the wound bed ✓ Cost effective ✓ Easy to use in homecare

Can be used with wide range of secondary dressings

- Foams, alginates, films, absorbent dressings etc.
- Use of expensive silver products is not necessary

Burn grade 2

- Male 70 years with hypertension and atrial fibrillation
- Grade 2 burn injury on right dominant hand caused by boiling water (a, b)
- Local treatment with Abilar 10% was innitiated immediately. Ointment application once a day
- Systemic therapy was not administered
- After two weeks of treatment injury was completely healed (c).
- No other treatment options needed or used

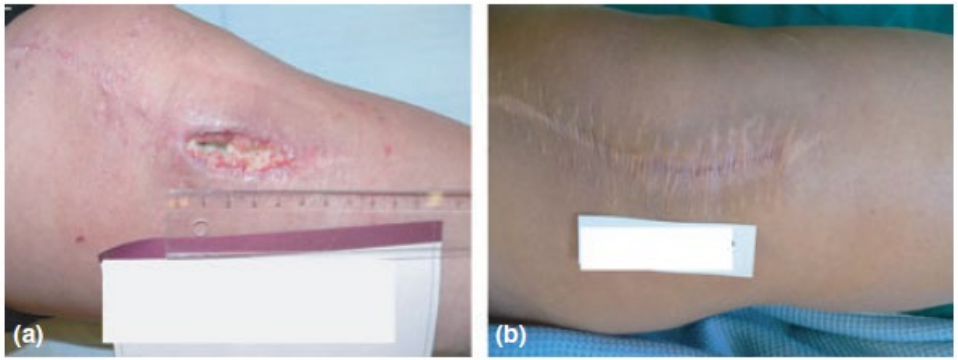
Pressure ulcers

- **Study**
  - Published in British Journal of Dermatology
  - Beneficial effect of resin salve in treatment of severe pressure ulcers: a prospective, randomized and controlled multicenter trial in 11 primary care centers
- **Compared products**
  - Abilar 10% Resin Salve
  - Market leading Convatec Aquacel Hydrofiber & Aquacel Ag
- **Results**
  - Abilar 10% healed 12 patients and 1 did not heal
  - Aquacel healed 4 patients and 5 did not heal
  - No allergic reactions or adverse events

Infected surgical wounds

- **Study**
  - Published in International Journal of Dermatology
  - Natural coniferous resin salve used to treat complicated surgical wounds: pilot clinical trial on healing and costs

- **Results**
  - All 28 patients healed
  - No allergic reactions or other adverse events
  - Abilar and cover dressing cost together was in average 1.2 EUR/day



Allergy

Approved by NHS UK

- Small share of population is allergic to rosins causing redness and itching of skin, which is contraindication to use the product
- Persons allergic to adhesives of surgical tapes and plasters may be allergic to rosin
- On allergic persons causes local allergic skin reaction that heals spontaneously

Literature

- Test for pyrogens according to the European Pharmacopoeia 2011, 2.6.8. Report 2013. Frey-Tox, Herzberg, Germany
- In vitro cytotoxicity test. Report 2013, CitoToxLab Scantox A/S, Denmark
- Skin sensitisation test /Abilar 10% Resin Salve) in the guinea pig using the Magnusson and Kligman methods. Report 2013, CitoToxLab Scantox A/S, Denmark
- Abilar 10% Resin Salve. Acute systemic toxicity in the mouse. Report 2013, CitoToxLab Scantox A/S, Denmark

Veterinarian use

- Norway Spruce Resin salve can be used on:
  - Acute wounds, scratches and bite wounds
  - Insect and tick bites
  - Injuries on paws and hooves
  - Excess granulation tissue/proud flesh (especially on horses)
  - Hot-spots, impetigos, folliculitis and furunculosis

- Resin salve maintains moisture on the wound to improve the wound healing. Apply more sparingly (1-2mm) than honey or other products with the exception of cavity wounds (e.g. bites) or to remove scabs.

- On festering (wet) wounds only apply thin layer to avoid maseration.

- Safety or clinical data is not available for mucuous membranes, eyes or mouth

How to use on animals

- Remove the hair on a larger area that needs to be treated.
- Clean the wound. Sometimes surgical revision / skin transplantation necessary.
- Apply sparingly (1-2mm) direct to wound or then to wound dressing which is then applied to wound
- On deep wounds apply direct to wound bed.
- Wound inspection & re-apply once a day.
- The amount of wound exudate is often higher in the beginning and gets less over time.
- When selecting the wound dressing please keep in mind that resin salve itself holds the moisture on the wound.

Infected surgical wound on MRSP dog

A MRSP bacterial infection was observed at the end of summer. Use of Antbiotic is challenging with such a case. The latter picture shows how resin salve reduced the infection and promoted the wound healing.

Summary

- When a tree suffers a wound, a branch tears or winter weather breaks its bark, the tree produces resin to allow it to heal itself. The purpose of the resin is to protect the tree from external effects such as various microbes (bacteria, fungus, yeast, mould), insects and also from drying out and other physical stress factors.

- Spruce resin is a compound of hundreds of different ingredients

- These ingredients contribute positively to wound healing of humans and animals which can be objectively measured both in vitro and in vivo

REPOLAR
PHARMACEUTICALS