samples were incubated in 28°C for up to 14 days. After the incubation and data collection, it was found that new formulations exhibited greater protective abilities than those tested in a previous stage. The improvement in protective abilities ranged from 8 to 92%. It was also observed that for the maize variety P8255, the formulation that exhibited the highest protective abilities proved to be the one based on the C6 group gemini surfactant containing an additional coating substance, substance reducing surface tension, and substance enhancing fungicidal action. For maize variety P9042, it was the formulation from the O group containing the same additives. Research will be continued as the final aim is to obtain a ready-made formulation that improves the quality and safety of stored corn grain.

Some aspects of biologically active substances of bee products – propolis, and wound-healing

Tarapata M., Kukhtenko O.S.

National University of Pharmacy, Kharkiv, Ukraine

automcorporation@gmail.com

Aristotle has coined the word propolis from the Greek words, pro (defense) and polis (city/community).

Propolis (bee glue, color varied, ranging from green to brown and reddish) is a resin-like material made by bees y mixing their salivary gland excretions with exudate accumulated from different parts of plants, mainly branches, bark, flower buds, leaves, and stems (buds of poplar and cone-bearing trees).

Bees use it in the construction and repair of their hives. Propolis seems to help as a protective barrier against fight against bacteria, viruses, and fungi etc. It might also have anti-inflammatory effects and help skin heal.

Propolis possesses a sweet or pleasant odor, and becomes soft and sticky upon heating, becomes liquid at 60 to 70 °C. Propolis must be purified and dewaxed via solvent (water, oils, propylene glycol, glycerol, the best effective solvent is ethanol) extraction to remove inert materials and preserve the phenolic fractions for medical use.

There are many different compounds in propolis of different geographic regions. It is including more than 300 different compounds as aliphatic acids, esters, aromatic acids, fatty acids, carbohydrates, aldehydes, amino acids, ketones, chalcones, dihydrochalcones, terpenoids, vitamins, and inorganic substances. Of all, flavonoids are the compounds that possess greater research interest. Such as, apigenin, chrysin, acacetin, catechin, daidzein, formononetin, naringenin, galangin, kaempferol, luteolin, liquiritigenin, myricetin, pinocembrin, rutin, and quercetin), phenolic acids (caffeic acid, chlorogenic acid, cinnamic acid, gallic acid, 4-hydroxybenzoic acid, 4-hydroxyhydrocinnamic acid, and 4-hydroxybenzoic acid-methyl ester), stilbene derivative (resveratrol).

Typically, raw propolis consists of resins and balms (50–60%), fatty acids and waxes (30–40%) as arachidonic, cis-13,16-docosadienoic, cis-11,14,17-eicosatrienoic, cis-5,8,11,14,17-eicosapentaenoic, eicosadienoic, elaidic, heneicosylic, linoleic, oleic, palmitic, and palmitoleic acid, essential oils (5–10%), and other components (5%) such as enzymes (acid phosphatase, adenosine triphosphatase, glucose-6-phosphatase, and succinic dehydrogenase), vitamins (B1, B2, B6, C, and E), minerals (Mg, Cu, F, Ca, K, Na, Mn, and Zn). It contains also monosaccharides - fructose and glucose, disaccharide - sucrose.

Propolis and its extracts confers several biological activities, such as antiviral, antibacterial, anticancer, antiulcer, antifungal, anti-inflammatory, antimycotic, antioxidant, antiviral, cardio protective, immunomodulatory, anti-allergic, antioxidant effects, neuroprotective, and wound-healing.

Combined treatment with propolis compounds of diabetic gangrene amputations of necrosis recessive, at old age (Fig. 1, 2).

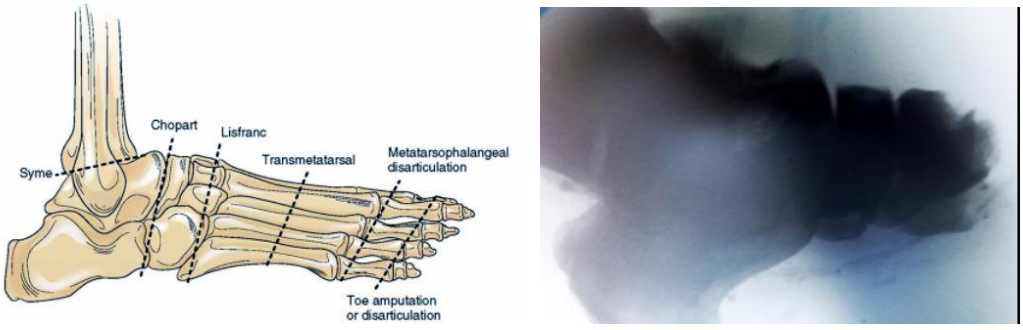


Fig. 1, 2. Amputation for of the midfoot

Clinical use of propolis and combined therapy demonstrated performed results with positive action on epithelization and successful wound closure.

Practical findings reveal that propolis speed up the tissue repair by stimulation of the wound bed matrix remodeling, proposing that the observed changes in extracellular matrix content after propolis application may be connected with the ability of its flavonoid compounds to reduce lipid peroxidation to prevent necrosis of cells Fig. 3.

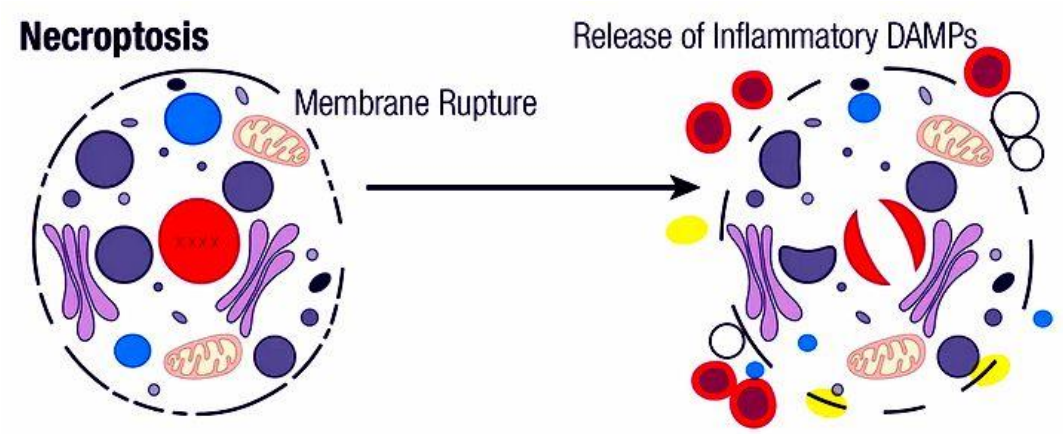


Fig. 3. Necrosis of cells.

The results confirm the propolis therapeutic efficacy, throughout quantitative and qualitative analyses of collagen types I and III expression and degradation in wounds matrix, indicating that propolis could have favorable biochemical environment supporting re-epithelization. That can see on Fig. 4, 5.

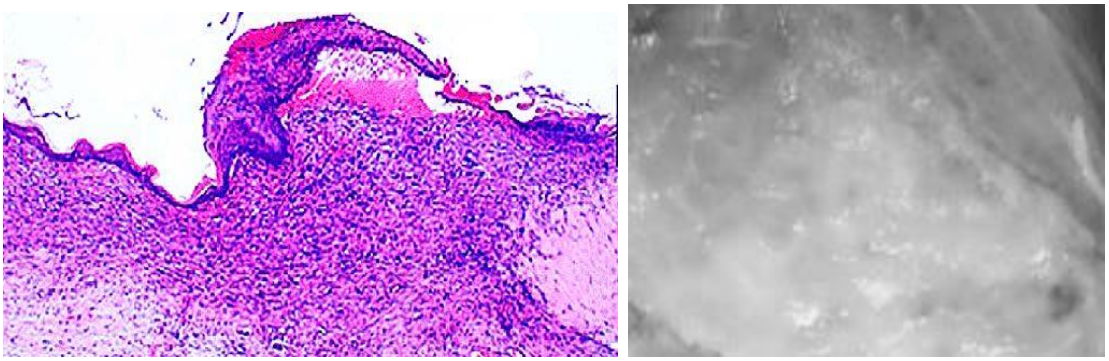
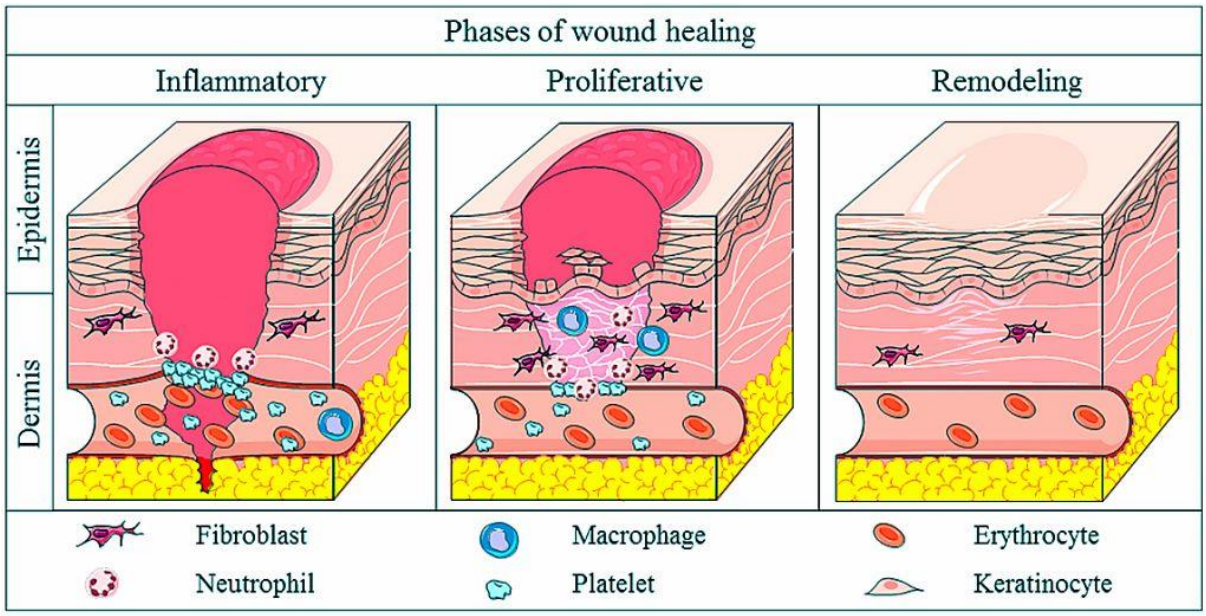


Fig. 4, 5. Re-epithelization.

Propolis, which is well tolerated with rare incidents of allergy and no toxicity, is referred to as an excellent candidate for burn, wounds management, enhancing skin cell proliferation, activation, and growth capacity Fig. 6, 7.



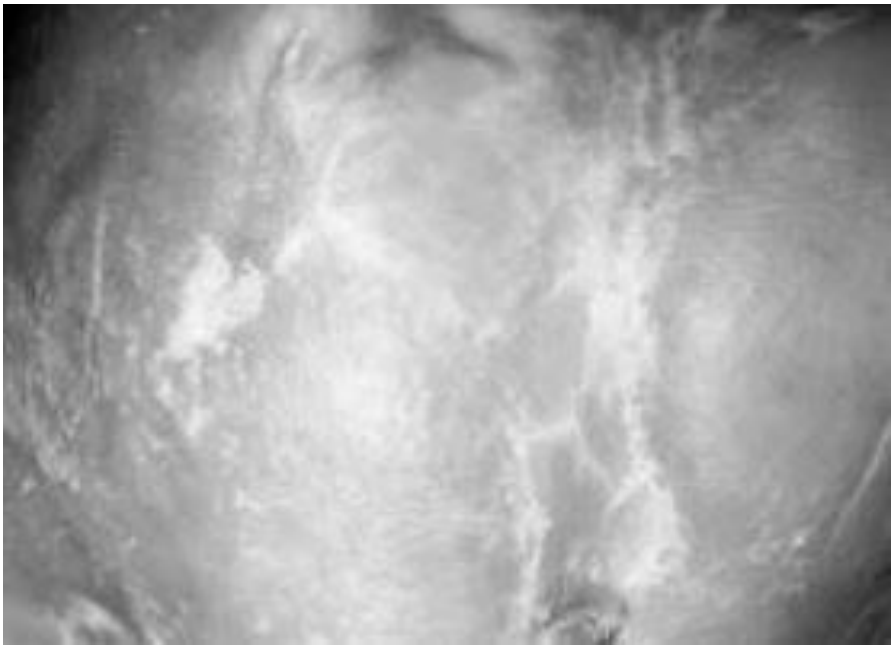


Fig. 6, 7. Wound repair and regeneration of cells.

Wound repair and regeneration proceeds via a finely tuned pattern of integrated phases, such as hemostasis, inflammation, cell proliferation, and tissue remodeling, which all involve a number of cellular and molecular processes.

Biological activities of propolis on wound repair and tissue regeneration is correlated to its antimicrobial, anti-inflammatory, and immumonodulatory properties.

The results of this treatment shown that application of propolis increases the wound healing rate and re-epithelialization of wounds and diabetic wounds.

Note. The photos are made by author.