**Investigations on drug-delivery systems**

**for transdermal med­ication and wound ca­re**

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**Abstract.** Transdermal drug delivery systems (TDDS) provide a controlled release of drugs from a loaded dressing on skin into the patient enabling a steady drug level in the blood circulation. This route of administration transfers the active ingredients without gastrointestinal or liver metabolism and maintain drug concentration within the therapeutic window for prolonged period of time [1]. The transport of drugs across skin to the blood capillaries is effected by means of a passive diffusion process.

The human skin is a mutilayered organ composed of different histological layers such as epidermis, dermis and subdermis. The outermost layer stratum corneum (SC) of epidermis consists of dead corneocytes and amounts about 100-150 µm. In contrast to lipophilic drugs, hydrophilic molecules achieve low penetration rates due to the biologic constitution of SC, and the molecular weights of the drug molecules should ideally be below 800-1000 Da [2].

The penetration barrier SC is more or less destroyed after radiation treatments or in advanced stages of chronic wounds. The therapeutic dressings are focused on the wound management by appropriate design achieving an improved, rapid healing. Emerging dressing technologies are based on materials such as hydrocolloids, alginates, hydrogels, polyurethanes [3], or applying smart and theranostic dressings in order to enable a “point-of-care” wound management [4].

The contribution provides a brief overview of the transdermal drug delivery systems including the nature of the barrier behavior of SC. Different techniques enhancing the drug penetration are discussed, and the difference of TDDS to dressings designed for the modern wound management will be outlined. The current development of the dressing technology up to energy harvesting “theranostic” wound overlays enabling a “point-of-care” treatment will complete the overview.

The preparation of gels as models of drug delivery dressings will be presented, as well as the pretreatment of hydrophilic drugs improving their penetration properties. Measurement results of the drug delivery and the passive transport across a gel-like membranes using a Franz diffusion cell are added and will be compared with different pharmacokinetic models [5] and their solutions.

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