

# Ravimuda toimemehhanismid

Viiu Tuulik, MD, PhD  
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# Mudaravi üldine ehk mittespetsiifiline toime

## Mehaaniline ja termiline

*Buoyancy, immersion, resistance and temperature all play important roles. According to the gate theory, **pain relief may be due to the pressure and temperature of the water on skin; hot stimuli may influence muscle tone and pain intensity, helping to reduce muscle spasm and to increase the pain threshold.** ...Overall, thermal stress has an immunosuppressive effect. **Antonella Fioravanti et al,** Mechanisms of action of spa therapies in rheumatic diseases: what scientific evidence is there? *Rheumatology International* January 2011, Volume 31, Issue 1, pp 1–8 |*

# Termostress- mõju vereringele

termostress stimuleerib piirkonna verevarustust ja seda saab objektiviseerida laserdoppleriga

**Capillary densities in heated tissue capillary fronts tripled from 2 to 7 weeks** (106.4+/-14.3 caps/mm<sup>2</sup> versus 39.1+/-18.5 caps/mm<sup>2</sup>). Furthermore, a mean temperature of 41.7+/-0.9 degrees C was measured in heated tissue capillary fronts at all durations, suggesting that this may be a threshold temperature for heat-induced angiogenesis or endothelial cell survival. **Seese et al**, Characterization of tissue morphology, angiogenesis, and temperature in the adaptive response of muscle tissue to chronic heating. [Lab Invest.](#) 1998 Dec;78(12):1553-62.

# Biomodulatsioon

mittespetsiifilise toime puhul on oluline organismi biomodulatsiooni võimekus-s.t. kuivõrd on võimalik treenida organismi adaptatsiooni mehhanisme (oleneb vanusest, haigusseisundistest, vegetatiivse närvisüsteemi seisundist jne) eesmärgiga parandada tervist.

*Hormesis is a biphasic dose-response phenomenon in which exposure of a cell or organism to a low dose of a chemical agent or condition induces stimulation or adaptive beneficial effects, while higher doses cause inhibition or toxic effects*

1. Calabrese et al. Biological stress response terminology: Integrating the concepts of adaptive response and preconditioning stress within a hormetic dose-response framework. *Toxicol. Appl. Pharmacol.* 2007;222:122–128. doi: 10.1016/j.taap.2007.02.015.

2. Mattson M.P. Hormesis defined. *Ageing Res. Rev.* 2008;7:1–7. doi: 10.1016/j.arr.2007.08.007.

[1](#), [2](#) - [Isabel Gálvez](#), et al Balneotherapy, Immune System, and Stress Response: A Hormetic Strategy? [Int J Mol Sci](#). 2018 Jun; 19(6): 1687. viite kaudu

# Mudaravi spetsiifiline toime

oleneb ravimuda keemilisest koostisest. Mudaravi mõju luulihaskonna põletikuliste haiguste korral on uuritud ja leitud, ka oluliste põletiku ja valu mediaatorite vähenemine veres mudapaketi või balneoteraapia järel

*Mud-bath therapy increases plasma  $\beta$ -endorphin levels and secretion of corticotrophin, cortisol, growth hormone and prolactin. It has recently been demonstrated that thermal mud-pack therapy induces **a reduction in the circulating levels of prostaglandin E2 (PGE2), leukotriene B4 (LTB4), interleukin-1 $\beta$  (IL-1 $\beta$ ) and tumour necrosis factor- $\alpha$  (TNF- $\alpha$ ), important mediators of inflammation and pain.** Spa therapy has been found to cause an increase in insulin-like growth factor-1 (IGF1), which stimulates cartilage metabolism, and transforming growth factor- $\beta$  (TGF- $\beta$ ). There is also evidence of the positive action of mud-packs and thermal baths on the oxidant/antioxidant system, with a reduction in the release of reactive oxygen (ROS) and nitrogen (RNS) species. **Antonella Fioravanti et al**, Mechanisms of action of spa therapies in rheumatic diseases: what scientific evidence is there? *Rheumatology International* January 2011, Volume 31, Issue 1, pp 1–8 |*

# Toime nahale - mineraalid

Ravimuda toimib üle naha. Naha läbitavusest sõltub keemiliste ainete jõudmine organismi ning spetsiifiline toime, mis tuleneb keemiliste ainete mõjust nahapinnale ja võimaliku resorptsiooni teel organismi sattuvate bioloogiliselt aktiivsete ravimuda koostisainete toimest.

*In Health Resort Medicine, both balneotherapy and thalassotherapy, salt waters and their peloids, or mud products are mainly used to treat rheumatic and skin disorders. These therapeutic agents act jointly via numerous mechanical, thermal, and chemical mechanisms...**When topically administered, this water rich in sodium and chloride penetrates the skin where it is able to modify cellular osmotic pressure and stimulate nerve receptors in the skin** via cell membrane ion channels known as "Piezo" proteins. [José Manuel Carbajo](#), [Francisco Maraver](#), August 2018 International Journal of Biometeorology 62(8):1345-1360*

# Toime nahale – muda ja turba humiinained

Turbaekstrakte on kasutatud krooniliste põletikuliste protsesside raviks , kuna turba erinevad komponendid on suutelised läbima nahka .

*Especially, the HPLC fractions 7-11 and 14 are able to permeate human skin. Fractions 7-11 show a **moderate stimulatory effect of spontaneous contractile activity of smooth muscle** for more than 90 min whereas fraction 14 shows the strongest stimulatory effect which was, however, suppressed after 87 min. These results show that the cutaneous therapy with peat treatment results in transcutaneous permeation of **biologically active fulvic and ulmic acid derivatives explaining the additional "chemical" effect of peat treatment in clinical practice.** Beer et al, Int J Pharm. 2003 Mar 6;253(1-2):169-75. Evaluation of the permeation of peat substances through human skin in vitro.*

# Mudaravi doseerimine

Seega - valides adekvaatse ravimeetodi – kasutades nii üldmudaravi kui ka lokaalset mudaravi ning sellest valmistatud tooteid – võiksime loota optimaalset ravi efekti nii haigusseisundeid ennetavas kui ka taastavas ravis.

*Balneotherapy is an effective complementary approach in the management of several low-grade inflammation- and stress-related pathologies, especially rheumatic and metabolic conditions. ...Due to the variety and heterogeneity of balneotherapy modalities, water and mud compositions, and application protocols, it is difficult to determine the exact intervention for obtaining optimal biological and clinical outcomes in different pathologies. Furthermore, **the regulation of altered inflammatory and stress status by this strategy could be conditioned by each specific disease's basal set-point**, so whether the benefits of balneotherapy could be extended to other conditions or even healthy subjects remains unknown. [Isabel Gálvez](#), et al Balneotherapy, Immune System, and Stress Response: A Hormetic Strategy? [Int J Mol Sci](#). 2018 Jun; 19(6): 1687.*