
# Implen Journal Club | December Issue, 2022

**Welcome to our December issue of the #Implen #JournalClub in 2022.**


In this issue of the Implen NanoPhotometer® Journal Club - Holiday Edition, we are exploring the possible benefits of snuggling up by the fire with hot cocoa the night before hitting the slopes to go skiing. Following intensive sports events, a higher rate of upper respiratory tract infections and the appearance of gastrointestinal symptomatology have been reported. Ruiz-Iglesias et. al. recently demonstrated the effect of a cocoa-enriched diet can partially attenuate the alterations in microbiota and mucosal immunity induced by high-intensity acute exercise. In their study reported in the Journal of Frontiers in Nutrition, it was shown that the intake of cocoa, partially

due to its fiber content, improved the short chain fatty acids (SCFA) production, prevented some changes in Peyer's patches (PPs) lymphocyte composition, mesenteric lymph nodes (MLNs) and also decreased the production of proinflammatory cytokines. Cocoa diet, contrary to cocoa fiber, did not prevent the lower salivary immunoglobulin (IgM) content induced by exercise. Nutrition is important to meet the body's energy and structural needs, as well as to improve the functionality of various body systems. Among these, immune function can be improved by several foods.

The results of this study indicate that the intake of cocoa in the days prior to an intense bout of exercise can partially prevent the alterations induced by it. Some of the changes produced by the cocoa diet on the intestine can be attributed to its fiber content, but other changes denote interaction between the phenolic compounds and methylxanthines, which is worth studying in depth. Moreover, further research might ascertain whether a more intensive exercise or a sustained exercise can exacerbate the observed alterations, and assess the potential protective effect of cocoa fiber in an even more impaired immune system.

The NanoPhotometer® was used in this study to quantify RNA.

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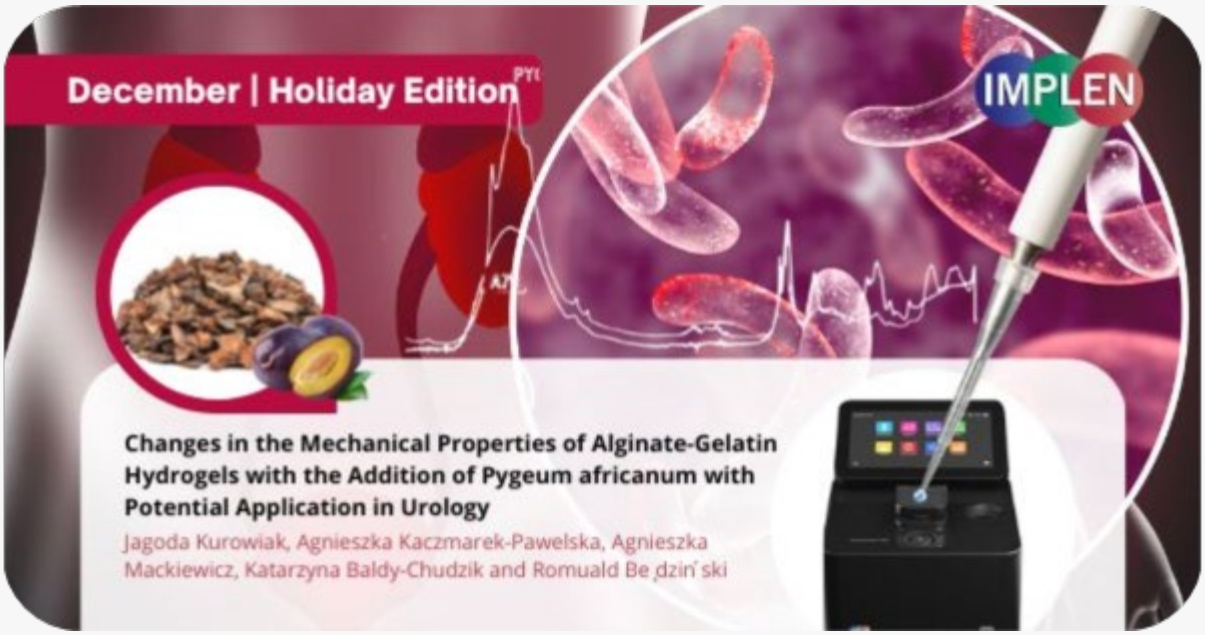


Next issue is highlighting the Nutcracker's "Dance of the Sugar Plum Fairy " by exploring the healing properties of African plum bark (Pygeum africanum). New hydrogel materials developed to improve soft tissue healing are an alternative for medical applications, such as tissue regeneration or enhancing the biotolerance effect in the tissue- implant–body fluid system. The biggest advantages of hydrogel materials are the presence of a large amount of water and a polymeric structure that corresponds to the extracellular matrix, which allows to create healing conditions similar to physiological ones. Kurowiak et. al. recently published in the International Journal of Molecular Science the results of their investigation focused on the modification of sodium alginate hydrogels containing gelatin and bark of African plum.

On the basis of mechanical tests, it was found that sodium alginate-based hydrogels with gelatin

showed weaker mechanical properties than without the African Plum Bark additive. In addition, antimicrobial studies have shown that the presence of African plum bark extract in the hydrogel enhances the inhibitory effect on Gram-positive and Gram-negative bacteria. The research topic was considered due to the increased demand from patients for medical devices and to develop a material with characteristics suitable to promote healing of urethral damage. Hydrogels, since the 1990s, have been the object of intensive research for many scientists. Their crucial advantage is that they are elastic materials with low stiffness, which allows them to be developed for soft tissue healing because they have similar mechanical properties and improve physiological load distribution in the tissue.

The NanoPhotometer® NP60 was used in this study to measure the dynamic bacterial growth spectrophotometrically at OD 600 nm on discs of hydrogel samples.

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In this issue, we are exploring the topic of Saving Christmas Trees with the work of Wang et. al. reported in the Journal of Forests to combat Pine wilt disease (PWD), which constitutes one of the most serious conifer diseases worldwide, affecting Pinus spp. from the Far East forestlands (Japan, China, Korea), and to Europe (Portugal and Spain) and North America. PWD is caused by the pinewood nematode (PWN), with PWN transmission being dependent on a vector insect, such as Monochamus alternatus (Hope). In this study, the key gene in internal causes of PWN, a departure from its vector beetle Monochamus alternatus by identifying the gene expression differences between the RNAs of two groups of PWNs 7 days after emergence.

It was found that the expression of the choline-phosphate cytidylyltransferase gene (pcyt-1) was markedly up-regulated. After inhibition of pcyt-1 expression by RNA interference, the rate of lipid degradation in PWN decreased significantly, and the motility of PWN also decreased significantly. Increased motility requires a large amount of energy (in the form of ATP), and the degradation of neutral storage lipid droplets in PWN can release energy. Therefore, the degradation of lipids may be an important endogenous cause of PWN departure. In this present

study, it was shown that the lipid droplets content of PWN was markedly higher after pcyt-1 RNAi than the control, whereas the motility of PWN in the RNAi-treated group was markedly lower than that of those in the control group. This indicates that lipid degradation is a necessary pre-condition for PWN departure from M. alternatus.

The NanoPhotometer® was used in this study to assess RNA purity and concentration.

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In this final issue for 2022, we are celebrating the 12 Days of Christmas highlighting the Six Geese a Laying and Seven Swans a Swimming in the High Arctic archipelagos. Krasheninnikova et. al. conducted a biodiversity and ecosystem study published in the Journal of Polar Science of the freshwater bodies' survey of the nine islands in the Franz Josef Land archipelago. Freshwater lakes and streams along with associated coastal habitats were examined for hydrochemistry, elemental composition of sediments, microbiota, macrozoobenthos, flora and vegetation as well as ornithofauna.

As the first dedicated multidisciplinary study of the freshwater ecosystems in the High Arctic, a variety of the freshwater objects was revealed including 14 species of birds including a flock of moulting brent geese being recorded on lake near Orgel Cape, Wilchek Island and a vagrant whooper swan being observed using lagoon lakes on Northbrook Island. Despite the harsh conditions and their ephemerality, freshwater bodies of the High Arctic Franz Josef Land support diverse microflora and macrozoobenthos, while adjacent riverine and lacustrine habitats are often inhabited by grass-moss and moss communities with high coverage.

Freshwater ecosystems are an integral part of the Arctic biome as diverse Arctic freshwater systems with associated habitats and biodiversity provide various ecosystem and economic services important for local and indigenous peoples, as well as for larger economies. Moreover, the enormous runoff of the northern, especially Russian, rivers largely affects chemical and physical processes and biodiversity of the Arctic shelf seas. As a result of this study, the Franz Josef Land is proposed as a core site for the Circumpolar Biodiversity Monitoring Program

(CBMP) freshwater monitoring network, which currently lacks any monitoring sites in the Russian High Arctic, and has the only site at similar latitudes in the Canadian Arctic Archipelago.

The NanoPhotometer® N50 was used in this survey study to determine the concentration of extracted genomic DNA to assist in quantifying representatives of heterotrophic and hydrocarbon-oxidizing bacteria with the species identification being confirmed by genetic methods.

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