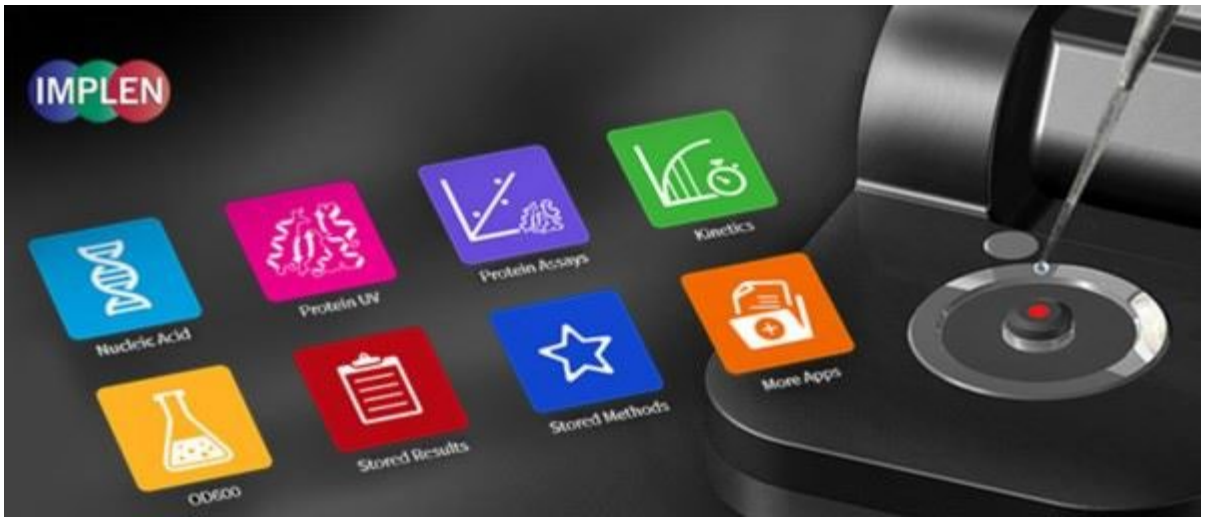
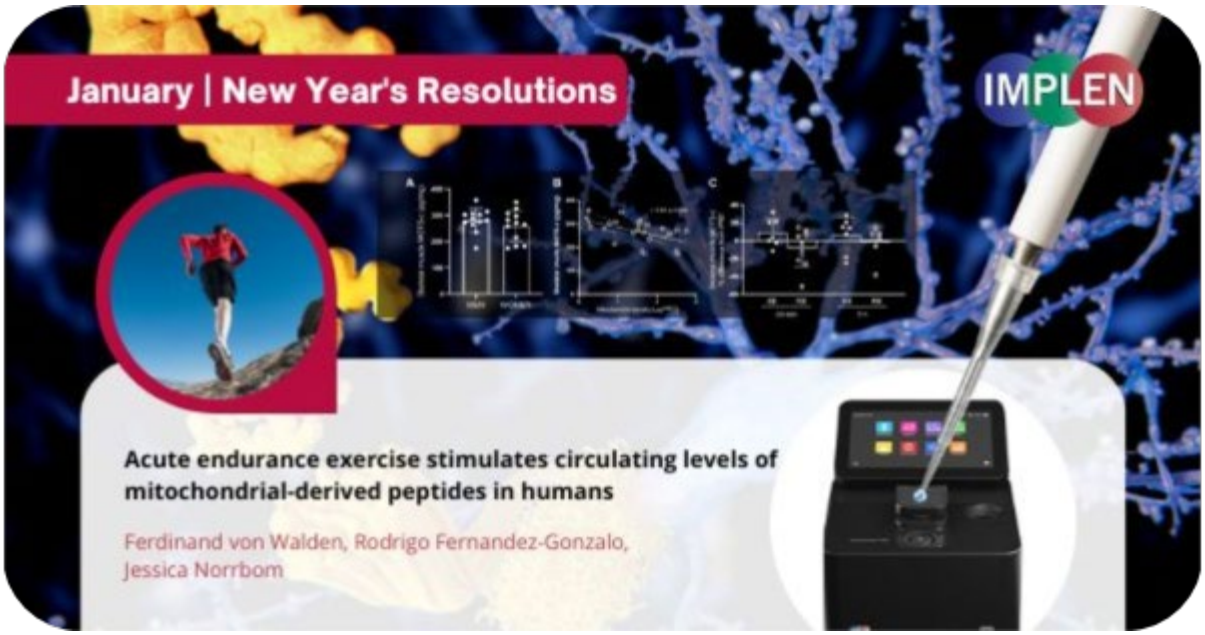


Implen Journal Club | January Issue

Welcome to our January issue of the #Implen #JournalClub in 2023.
New Year's Resolutions Edition



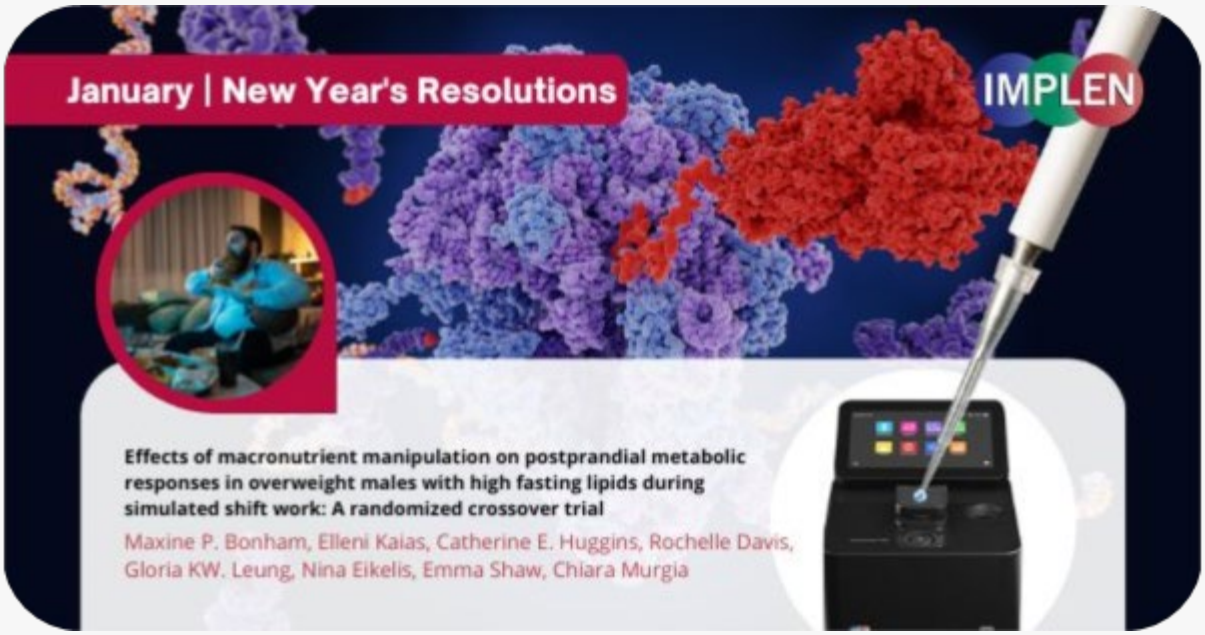
To help jump-start New Year's resolutions for 2023, the first issue of Implen NanoPhotometer® Journal Club is covering some potential benefits of endurance exercise on health by highlighting the work of von Walden et. al., who reported for the first time in the Journal of Applied Physiology that circulating levels of mitochondrial-derived peptides (MDPs) respond to different modes of physical exercise. In this study it was shown that acute endurance exercise (EE) stimulates circulating levels of mitochondrial-derived peptides (MDPs), whereas acute resistance exercise (RE) does not. In addition, plasma levels of MDPs were not correlated to fitness outcomes.

Circulating levels of MDPs are altered in chronic diseases such as diabetes type 2 and chronic kidney disease.

The first MDP described was humanin (HN), which along with having a protective effect against Alzheimer's disease, has been shown to be linked to metabolism including improved insulin action and secretion affecting glucose homeostasis with patients with impaired glucose control having reduced circulating levels of HN. Circulating levels of HN were significantly elevated by acute EE but not RE. These results indicate that plasma MDP levels are not related to fitness status but that acute EE increases circulating levels of MDPs, in particular HN.

The NanoPhotometer® NP80 was used in this study to determine the quantity and quality of extracted DNA.

Learn more

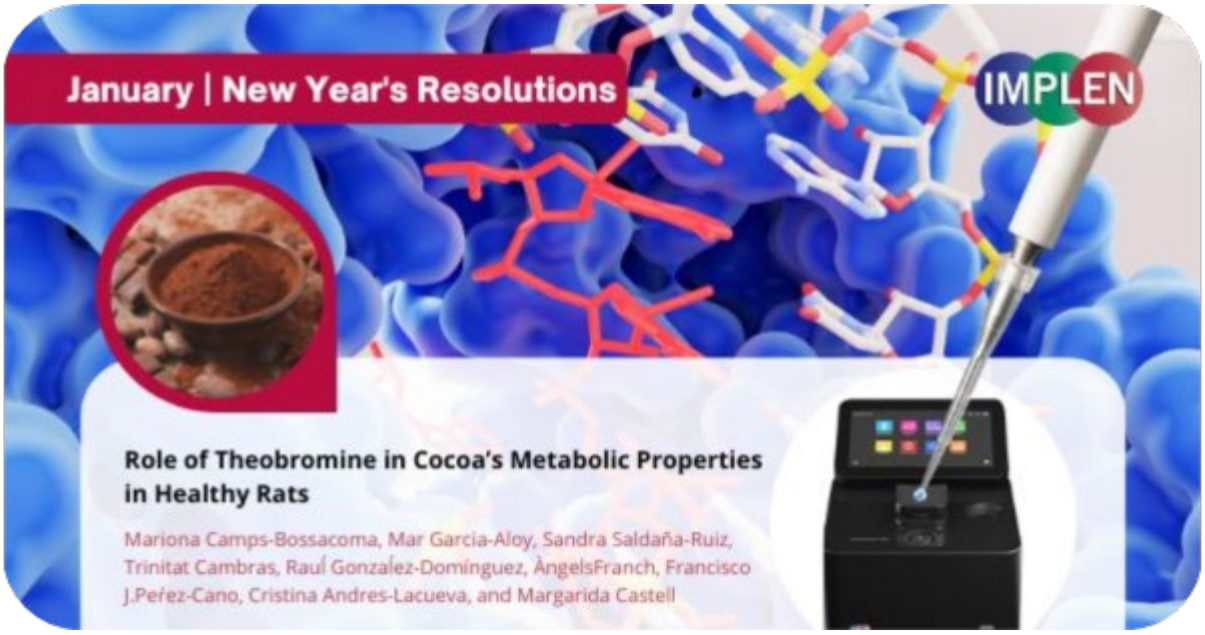


Next issue is emphasizes an important consideration to keep in mind for one of the top resolutions made each year of eating healthier - the role and effects of night time eating. Meals consumed out of synchronization with normal circadian rhythms are associated with metabolic dysregulation. Changes in macronutrient composition of meals can improve metabolic responses during the day. The same meal consumed during the night, compared with during the day, is associated with increased glycemic excursion and a reduced insulin sensitivity - a phenotype metabolically equivalent to being pre-diabetic.

Bonham et. al. investigated whether macronutrient manipulation of meals alter the post-meal glucose and lipid response and the expression of circadian genes during the night. The findings of this study were reported in the Journal of Clinical Nutrition that glycemic control was significantly improved when participants were provided with the control meal compared with a meal higher in sugar whilst no difference was observed in postprandial lipemic responses between the meal challenges, even though the control meal was lower in total and saturated fat. This work contributes to the growing literature on the impact of meal timing and food choice on metabolic health.

The NanoPhotometer® was used in this study to determine the concentration and quality of RNA in the sample and 260/280 absorbance ratio.

Learn more



In this issue, we are exploring the potential beneficial effects of cocoa on metabolism. Cocoa is rich in polyphenols and methylxanthines, and in recent years has increasingly attracted attention because of its potential health effects. Cocoa's anti- inflammatory, antioxidant, anti-allergy, and antiobesity properties have been reported; its intake also influences mood, intestinal microbiota, the cardiovascular system, and, interestingly, the metabolic profile. Within the role of cocoa in metabolic properties, it has been shown that cocoa consumption has a beneficial effect on obesity as well as in the improvement of glucose, lipids, and insulin levels. Camps-Bossacoma et al. revealed in the Journal of Agriculture and Food Chemistry results showing theobromine is the main factor responsible for cocoa's effects on body weight gain as well as on the lipid and glucose metabolism. These data suggest that supplementation with theobromine could provide the same metabolic benefits as cocoa.

The NanoPhotometer® was used in this study to determine RNA concentration.

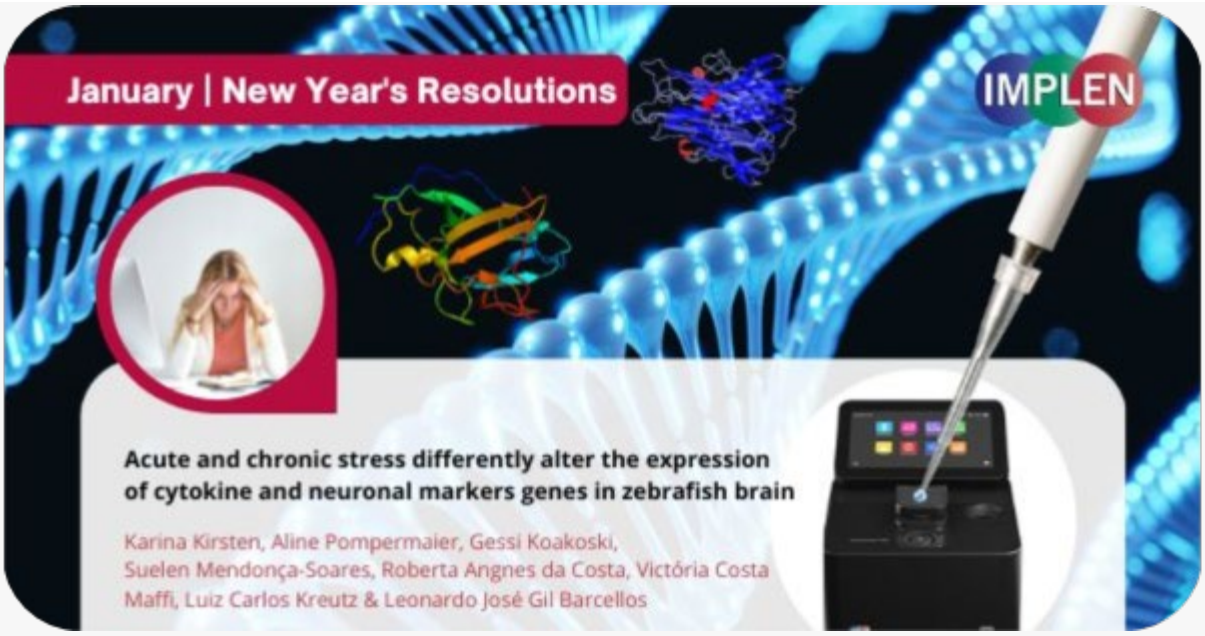
Learn more

The next issue is dedicated to supporting the resolution that many people have for the new year to lose weight. L-arginine supplementation reduces white adipose tissue (WAT) and boosts substrate oxidation, both of which are beneficial for the treatment of obesity and type II diabetes. When energy intake and expenditure are out of balance, white adipose tissue (WAT) builds up unhealthily, leading to obesity, which is a breeding ground for many metabolic diseases. WAT browning is a prospective therapeutic target for metabolic disorders related to obesity and obesity itself. The most efficient physiological catalyst for WAT browning, exposure to low temperatures, works by increasing NO generation and subsequent nitrosative redox signaling.

Kalezic et. al. recently demonstrated in the Journal of Pharmaceutics that L-arginine could cause browning of the WAT, with the key structural, metabolic, and molecular biomarkers of WAT browning—gene and protein expression of key thermogenic and beige adipocyte genetic markers, transcription factors, and their downstream mitochondrial targets— being triggered as a result of the increase in NO brought on by the L-arginine treatment. The findings support L-arginine as a medical substitute for exposure to cold, which may be very important for treating obesity and related metabolic problems.

The NanoPhotometer® was used in this study to determine the concentration and quality of RNA samples as well as the total concentration of DNA.

Learn more



One of the top New Year's Resolutions in 2023 is to reduce stress on the job. This issue is focusing on the potential effects of reducing acute and chronic stress on the supporting healthy immune system function. Stress is a growing condition of significant concern to public health as stressing episodes induce metabolic changes and may be linked to several illnesses including those that impact the central nervous system and cardiovascular diseases, such as depression and anxiety. Kirsten et. al. described in the International Journal on the Biology of Stress how stress, both acute and chronic, affected the brain's expression of specific immune-related genes and neuronal function markers. Their key findings demonstrated that unpredictable chronic stress triggered the expression of the pro-inflammatory cytokine genes IL-1β and TNF-α, the anti-inflammatory cytokine IL-10 (negative feedback from the immune system), reduction in cFOS gene expression, and caused neuro-inflammation. The expression of these genes related to inflammation and neural plasticity were significantly altered by chronic stress but not by acute stress, indicating that a single stressful episode does not affect cerebral homeostasis. These findings extend our knowledge about the interaction of the immune system and the different forms of stress.

The NanoPhotometer® was used in this study to measure the RNA quality and concentration by spectrophotometry.

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