

OPINION

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A technological breakthrough in developing a state-of-the-art nutraceutical sports nutrition formulation to enhance vitality, mental acuity, vigilance, energy, and stamina

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Abstract

The researchers demonstrate the development of a novel Prodosome technology-derived PL425 PEC phytonutrient-enriched electrolyte formulation and its significant contribution in fluid homeostasis as well as enhanced neuro-muscular function, cardio-protection, pulmonary, and other physiological cellular and organ functions. Electrolytes enriched in phytonutrients including polyphenolic bioflavonoids, anthocyanins, saccharides, sulforaphanes, carotenoids and exotic spices, in conjunction with a full spectrum of sea water-derived electrolytes, such as sodium, chloride, potassium, calcium, phosphate, magnesium and bicarbonate, along with vitamin C, all of which are encapsulated in the proprietary Prodosome technology enabling enhanced bioavailability. This technology will maintain important biological functions including metabolic and energy homeostasis, pH equilibration, free radical inhibition, cell-to-cell communication, muscular integrity, enhanced neuronal, cardiovascular, pulmonary, and kidney functions. Moreover, these phytonutrients and electrolytes enhance energy metabolism, ATP production, and activate nitric oxide production without L-Arginine. Ongoing research studies are in progress.

Keywords: Phytonutrients, Electrolyte balance, Micronutrients, PL425PEC, Prodosome technology, Metabolic homeostasis, Immune and brain health

Electrolytes, fluids, minerals, vitamins, and phytonutrients are essential for proper functioning of the cells, physiological pH in various tissue and cellular compartments, and vital organs in a human body (Downs et al. 2021; Loeb 1911; Loeb 1918; Water and electrolytes (Chapter 11) 2020; Electrolytes (Chapter 15) 1989; Kunwar & Priyadarsini 2011; Lorenzo-Lopez et al. 2017; Fletcher & Fairfield 2002). Especially, these constituents are crucial for the basic physiological functions including metabolic functions and energy homeostasis, pH balancing, inhibiting oxygen free radical generation,

cell-to-cell communications, cardiovascular well-being, and muscle performance. In a human body, electrolytes are continuously eliminated through urine, sweat, feces, skin sloughing, and menstruation (Downs et al. 2021; Loeb 1911). A deficiency of alkalinizing electrolyte buffers leads to diverse degenerative disorders, while restoration of electrolytes is crucial for pH buffering to balance alkalinity and acidity, especially important for boosting all aspects of healthy biological functions and human health. In addition, enhanced production of adenosine triphosphate (ATP) and nitric oxide (NO), in conjunction with suitable electrolytes and phytonutrients provide synergistic benefits to boost cardiovascular and neuromuscular functions essential for a proper sports nutrition formulation (Downs et al. 2021;

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Fletcher & Fairfield 2002; Kunwar & Priyadarsini 2011; Lorenzo-Lopez et al. 2017).

Following are selected research driven nutraceuticals that exhibited potential benefits in the design of a novel sports nutrition formulation:

1. **Selected electrolytes and physiological functions:**

Electrolytes perform three important functions such as (i) muscular integrity and performance, (ii) improved brain functions and cell-to-cell communication, and (iii) maintain hydration status and pH homeostasis in diverse tissues. Use of solar-dried sea water electrolytes comprised of a full spectrum of electrolytes including calcium, magnesium, chloride, potassium, sodium, and phosphorous are recommended for benefits (Downs et al. 2021; Loeb 1911; Loeb 1918; Water and electrolytes (Chapter 11) 2020; Electrolytes (Chapter 15) 1989).

2. **Synergistic blend of phytonutrients:** This formulation is comprised of a synergistic blend of (a) polyphenolic bioflavonoids, anthocyanins and saccharides extracted from coffee cherry, green tea, onion, *Sophora japonica*, acai, blackcurrant, blueberry, sweet cherry, blackberry, chokeberry, raspberry, bilberry, elderberry, camu camu, acerola, and spinach concentrates. These extracts and concentrates are rich in phytosterols, diverse micronutrients, and minerals, vitamins, fructooligosaccharides, structurally diverse bioflavonoids, anthocyanins, flavonoids, chlorogenic acid, folate, ellagic acid and dietary fibers; (b) carotenoids including β -carotene, and other phytonutrients derived from kale leaf, carrot root- and tomato fruit concentrates; (c) sulfuraphanes comprised of broccoli sprout seeds, broccoli florets and stems, and Brussel sprout edible head concentrates; (d) exotic spice concentrates derived from oregano, cinnamon, turmeric, garlic, and basil leaf concentrates containing essential oils, cinnamaldehyde, curcuminoids, alliin, allicin, and sulfur containing compounds; and (e) ElevATP, a clinically proven combination of aqueous extracts rich in magnesium, carbon, nitrogen, oxygen and sulfur derived from ancient peat and apple peel extract to enhance production of NAD⁺ and cellular ATP (Downs et al. 2021; Fletcher & Fairfield 2002; Kunwar & Priyadarsini 2011; Lorenzo-Lopez et al. 2017).

3. **Design of a novel, phytoceutical enriched Electrolyte formulation:** A state-of-the-art phytonutrient enriched electrolyte formulation was developed using a combination of solar dried sea water electrolytes, vitamin C, and phytonutrients. This combination was bioengineered in a proprietary Prodosomed technol-

ogy to enhance micronutrient absorption, bioavailability, blood oxygenation, and metabolic homeostasis. The manufacturing technology utilized a non-GMO lecithin containing >85% phosphatidylcholine, which was impregnated and saturated with solar-dried electrolytes from sea water to assure the availability of free ions. It is important to emphasize that the full spectrum of naturally occurring sea water electrolytes provides the identical profile and proportion of electrolytes that exist in human blood. Selected phytonutrients and vitamin C were blended in a proprietary high-speed dry-blending procedure with the sea water-derived electrolyte-enhanced phospholipids that ensures optimal bio-encapsulation to achieve a novel energetically enhanced Prodosome[®] technology. Clinical studies affirmed the ability of PL425 PEC to enhance cellular ATP levels, as well as improve electrolyte, nitrogen, and oxygen utilization. The research demonstrated enhanced bioavailability, improvement in blood properties, hemoglobin, and neutrophil restoration, and several other biomarkers (Downs et al. 2021).

The consumption of a comprehensive range of bioavailable nutrients including structurally- and functionally different vitamins, minerals, amino acids & proteins, carbohydrates & sugars, fatty acids, selected phytonutrients, and enzymes, is necessary to achieve optimal synergistic bio-physiological health benefits to enhance sports performance. Furthermore, these novel phytonutrients and electrolytes enhance energy metabolism, ATP production, and activate nitric oxide production without L-Arginine.

Abbreviations

ATP: Adenosine triphosphate; NO: Nitric oxide; NAD⁺: Nicotinamide adenine dinucleotide; restoration, and several other biomarkersGMO: Genetically modified organism.

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Competing interests

Dr. D. Bagchi and Dr. M. Bagchi are independent research consultants. Steve Kushner is a technical consultant, and B.W. Downs is as employee of VNI Inc., Bonita Springs, FL.

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