Nanoscale Carnosine Patches Improve Organ Function

Homer Nazeran[1] and Sherry Blake-Greenberg[2]

[1] BioMedEng Consulting, El Paso, Texas, USA
[2] Health Integration Therapy, Paolos Verdes, California, USA

Abstract— **Carnosine (β-alanyl-$_L$-histidine) is a naturally occurring dipeptide present in brain, cardiac muscle, stomach, kidney, olfactory bulbs and in large quantities in skeletal muscle. As free-radical-induced damage to the cells is an important factor in causing *aging and senile diseases*, carnosine has the potential ability to *prevent and treat* diseases such as atherosclerosis, diabetes, Alzheimer's and senile cataract. Recent clinical research shows that carnosine has the ability to rejuvenate senescent cells and delay eyesight impairment and cataract, which are manifestations of the *aging process*. These results provide valuable data in favor of considering carnosine as a natural *anti-aging* substance.**

Bioelectrical impedance data indicative of cellular physiologic organ function (status), using an Electro Interstitial Scanning (EIS) system, were acquired from twenty volunteers:7 males and 13 females, 19-83 (mean 43) years, 118-185 (mean 150) lbs in weight, and 5'-6' (mean 5',5") ft in height. Cellular physiologic function testing was evaluated in 10 organs (*pancreas, liver, left/right kidneys, intestines, left /right adrenal glands, hypothalamus, pituitary and thyroid glands*) while wearing a nanosclae carnosine patch for 2 weeks. EIS testing was repeated each week. Cellular physiologic function baseline data were acquired from all subjects at the beginning of the study period before application of the nanoscale carnosine patch. Subjects were instructed to keep well hydrated during the study period. All subjects served as their own control. The hypothesis to be tested was: *The carnosine patch worn 12 hours/day on alternate days for two weeks significantly improves cellular physiologic functional status in different organs.*

Statistical analyses revealed that the carnosine patch worn 12 hours daily on alternate days (Tuesdays, Thursdays, and Saturdays) over a period of 2 weeks produced a *very significant ($p < 0.01$)* improvement in the physiologic functional status of the *pancreas, liver, right kidney, left /right adrenals, hypothalamus, pituitary and thyroid glands* with an average statistical power >95%.

Keywords— **Nanotechnology, Carnosine patch, Aging, Cellular physiologic function measurements, Electro interstitial scan (EIS) system, LifeWave.**

I. Introduction

Carnosine termed an "amazing anti-aging nutrient" is a dipeptide molecule comprised of 2 amino acids: beta-alanine and L-histidine. It was first isolated from meat extracts by Russian scholars Gulewitsch and Amiradzibi in 1900 [1]. It is a naturally occurring (endogenously synthesized) molecule present in brain, cardiac muscle, stomach, kidney, olfactory bulbs and in large quantities in skeletal muscle [2]. Many studies on biological and biochemical effects of carnosine have suggested that it possesses antioxidant and free radical scavenging properties [3]. Free radicals are dangerous by-products of normal metabolic processes converting food to energy. Free radicals are unstable oxygen-containing molecules, which are hungry for electrons to quench their insatiable desire for cell destruction. Carnosine like its "dancing partner" glutathione is an antioxidant that serves as an endogenous defense against the harmful effects of free radicals, by quenching the destructive free electrons in these molecules. The balancing act between free radicals and antioxidants could be easily disrupted for any reason such as when the body is under stress, fighting an infection or inflammation or healing from an injury, in which case more free radicals are generated. Free radicals are also created when the body is exposed to cigarette smoke, alcohol, ultraviolet light, heavy metals, air pollution, pesticides, food additives, and other environmental toxins.

Free radicals are the underlying cause of a variety of illnesses in the body [4]. They are also one of most important possible causes of *aging* and senile diseases [5]. The literature shows that the emergence and development of *aging* are closely related to free-radical-induced damage to cells. Free radical damage leads to instability and malfunctioning of the cells, which consequently cause senile diseases such as atherosclerosis, diabetes, Alzheimer's disease, and senile cataract. Research on the biological and biochemical effects of antioxidants and free radical scavenging molecules such as glutathione and carnosine has shown that these compounds have the ability to protect cells from the harmful effects of free radicals and therefore could exert a normalizing function on cell metabolism and therefore serve as endogenous *anti-aging* compounds.

Extensive preliminary research by Russian scholars have shown that carnosine has a variety of beneficial effects including an increase in muscle strength and endurance, protection against radiation damage, enhancement of immunity and reduction of inflammation, protection against formation of ulcers and their treatment, treatment of burns, promotion of wound healing after surgery, improvement of appearance, etc.

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In a review, Quinn et al [6], suggest that carnosine and its related dipeptides could be considered as the water-soluble counterpart to lipid-soluble antioxidants such as vitamin E and serve to protect cells from oxidative damage. They refer to numerous studies that have demonstrated strong and specific antioxidant properties of these compounds both at the tissue and organelle level. They describe that carnosine and its related dipeptides play a number of roles such as neurotransmitters, modulation of enzymic activities and chelation of heavy metals. They also describe that these compounds have antihypertensive, immunomodulating, wound healing and antineoplastic effects.

Hipkiss et al [7], present evidence to suggest that carnosine in addition to its antioxidant and oxygen free-radical scavenging activities, also reacts with deleterious aldehydes to protect susceptible macromolecules. They propose that the role of carnosine and its related dipeptides should be explored in pathologies that involve deleterious aldehydes, for example, secondary diabetic complications, inflammatory phenomena, alcoholic liver disease, and possibly Alzheimer's disease. For a more detailed study on carnosine beneficial effects please refer to the references listed in reference [8].

The current methods of oral supplementation with carnosine would take 1-4 months to show any significant effects. Marios Kyriazis MD has performed a preliminary experiment using L-carnosine supplements (50 mg daily) on 20 healthy human volunteers, aged 40-75 years, for a period of 1-4 months. He reports "No side affects were reported. Five users noticed significant improvements in their facial appearance (firmer facial muscles), muscular stamina and general well-being. Five others reported possible benefits, for example better sleep patterns, improved clarity of thought and increased libido. The rest did not report any noticeable effects. This is not surprising because supplementation with carnosine is not expected to show any significant noticeable benefits in a short time, but it should be used as an insurance against deleterious effects of the aging process. If any benefits are noted, these should be considered as an added extra bonus. It is worthwhile persevering with the supplementation long term, even if you do not experience any obvious benefits, as you will still be well protected against aging. Carnosine can be used together with vitamin E and/or Co-enzyme Q10 for full antioxidant protection, but even if it is used on its own it should still confer significant protection both against free radicals and against glycosylation." [9]

Our study is the first pilot investigation of its kind to explore the effect of the carnosine patch on organ physiologic function. Bioelectrical impedance data indicative of cellular physiologic function were acquired using an EIS system.

Cellular physiologic function in subjects were evaluated in 10 organs (pancreas, liver, left and right kidneys, intestines, left and right adrenal glands, hypothalamus, pituitary and thyroid glands) while wearing the carnosine patch for a period of 2 weeks, 12 hours/day on alternate days of the week (Tuesdays, Thursdays and Saturdays). Physiologic function testing was repeated each week. Each visit was approximately 1 hour in duration. Physiologic function baseline data were acquired from all subjects at the beginning of the study period before the carnosine patch was worn. Subjects were instructed to keep well hydrated (as 16% of body fluids is extracellular fluid), during the study period. All subjects served as their own control.

The overall data in this study demonstrated that the carnosine patch worn 12 hours daily on alternate days over a period of 2 weeks produced a *very significant ($p < 0.01$)* improvement in the physiologic functional status of the pancreas, liver, right kidney, left and right adrenals, hypothalamus, pituitary and thyroid glands with an average statistical power of at least 95%. Therefore, the *hypothesis was accepted as true*.

II. Material and Methods

Subjects: Twenty volunteer subjects: 7 males and 13 females, 19-83 (mean 43) years of age, 118-185 (mean 150) lbs in weight, and 5'-6' (mean 5',5") ft in height participated in this study. They wore the carnosine patch for 12 hours *daily*, on alternate days of the week (Tuesdays, Thursdays and Saturdays) for 2 weeks. After giving informed consent, cellular physiologic function baseline data were acquired from all subjects at the beginning of the study period before the carnosine patch was worn and then weekly afterwards. Subjects were instructed to keep well hydrated during the study period. All subjects served as their own control. The subjects were instructed to place the carnosine patch 2 inches inferior to the navel (below belly button) or on CV_6 acupuncture point according to manufacture's instructions.

Carnosine Patch: For this research, the nanoscale carnosine patch (LifeWave, La Jolla, California, USA) was used. The carnosine patch is described as a new method for increasing carnosine levels by stimulating acupuncture points on the body with a combination of pressure and infrared energy. "The carnosine patch is a non-transdermal patch that does not put any chemicals or drugs into the body. The carnosine patch contains natural nontoxic crystals that absorb body heat to generate infrared signals that cause the body to produce more endogenous carnosine." The patch remains active for 12 hours. The carnosine patch is termed the "dancing partner" of the glutathione patch and seems to enhance and complement its physiological effects.