

# Effect of Digested Peptides from Dietary Proteins on Regulation of Natural Health

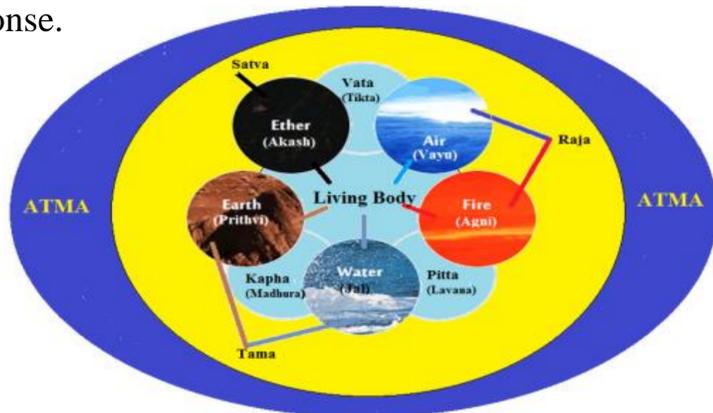
Raj Kumar and B.R. Singh

School of Indic Studies, Institute of Advanced Sciences, Dartmouth, MA 02747

## Abstract

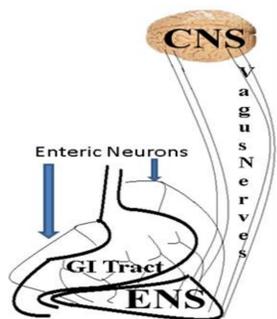
Physical and mental health can be maintained and preserved only as long as there is harmony in relationship between body, mind and soul. Food is believed to be one of the components to maintain this harmony and affects not only our physical health but mental functions, too. Diet influences the mind, which in turn affects the balance of body prakriti (*vata, pitta, and kapha; ayurveda*), thus leading to disease. Furthermore, a proper assimilation of dietary constituents is essential for maintenance of good health. Effects of diets on mind are now also established in modern medicine for several disorders. While the effect of diets on human health is well established, the mechanism by which the diet could affect the biological process is not clear at all. The goal of this study is to:

1) study of cellular response of digested proteins, producing small peptides, and 2) establish the connection between food/food components, cellular physiology and neuronal response.



**Figure 1:** Schematics showing human life consisting of body and sense-organs are made from pancabutras, which are influenced by tridosas (*vata, pitta, and kapha*) and trigunas (*sattva, rajas, and tamas*). *atma* (consciousness) pervades all to create human life.

## Enteric Neurons (The Second Brain)



**Figure 2.** Connectivity of CNS, ENS with gut system

-----This second brain can control the gut behavior on its own independently of CNS.

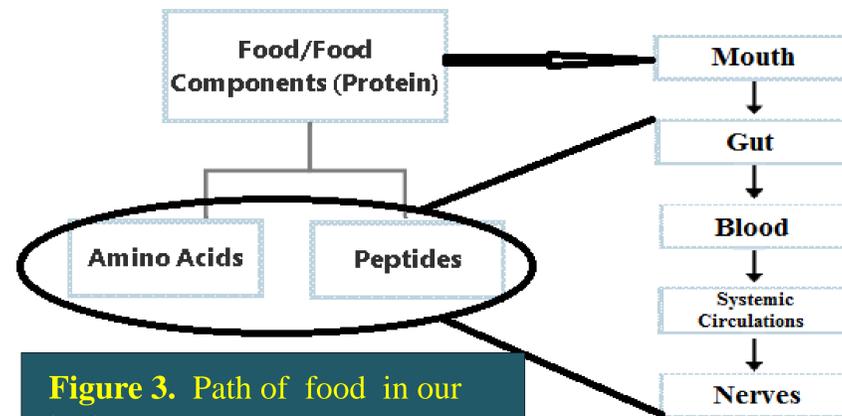
-----90% of information carried by vagus nerves is from gut to CNS not the other way around.

-----Scientists believe that big part of emotional behavior is influenced by the neurons in the gut.

----- Adult guts can generate new neurons.

----- 95% of serotonin found in gut.

## Hypothesis



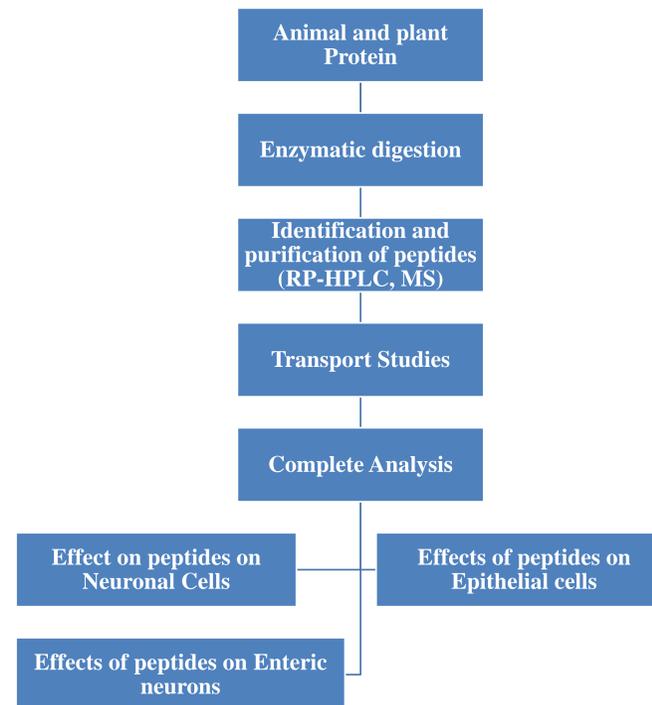
**Figure 3.** Path of food in our body

Digested food transported across the gut epithelium.

**First hypothesis:** Food (bioactive peptides) can effect communication between CNS and ENS

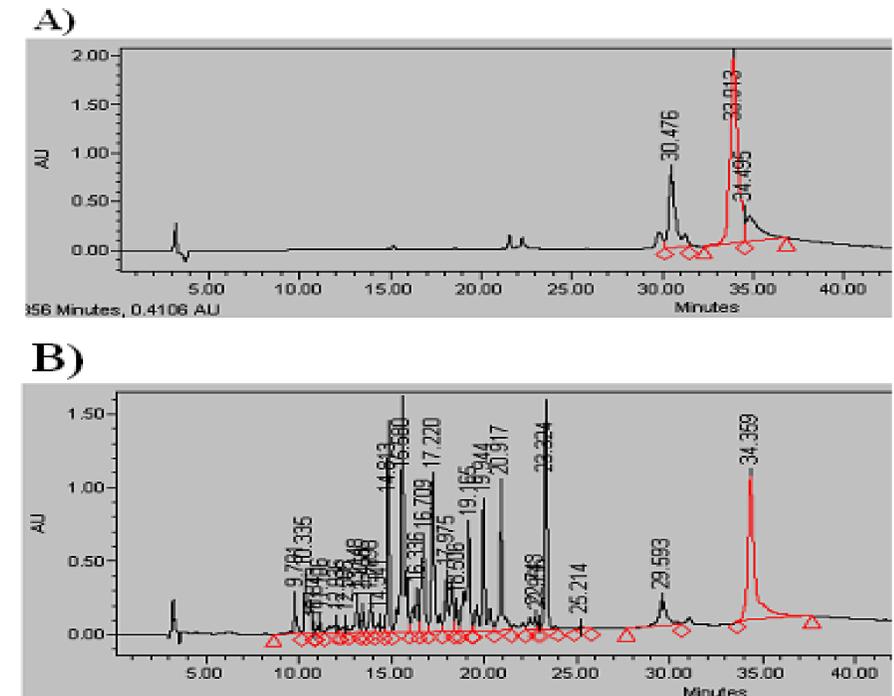
**Second Hypothesis:** Bioactive peptides can reach and affect the neuronal physiology of both CNS and ENS.

## Approach



**Figure 4:** Schematics of experimental Approach.

## Preliminary Data



**Figure 5:** Reverse phase HPLC of concavalin A A) and its digestion by intestinal enzymes, pepsin, trypsin and chymotrypsin (B, 220 nm). Digestions were carried out at 37°C for 2 hr . For pepsin, digestion was performed in SGF (simulated gastric fluid). Pepsin digested sample was further digested by trypsin and chymotrypsin in SIF (simulated intestinal fluid).

## Proposed work

1. To demonstrate that protein digestion under simulated gastric conditions produce peptide fragments of varying sizes.
2. Demonstrate effect of digested protein fragments on regulation of various genes in neuronal (SH-SY5Y and enteric neurons) and epithelial cells (HT-29) by RNA micro-array and other biochemical assays.

## Acknowledgements

1. Dr. Jaime Belkind-Gerson, M.D. Harvard Medical School for very useful discussions.
2. Dr. Shanthi Srinivasan, Emory University for providing us enteric neurons and useful discussions.
3. 3R foundation for proving us funds and support for pursuing this research.