A philosophy for integration of ayurveda with modern medicine: A biochemist’s perspective

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Ayurveda — wisdom of life — the Indian traditional medicine, is a science developed mainly by the experience and wisdom of our ancestors. As against this, modern medicine (allopathy) is a recently developed, experiment-based science of well-defined chemicals with known mechanisms of action, and possible side effects and toxicity. As the former is experience based and the latter is experiment-based, the former is regarded as arbitrary and the latter as a more exacting science and hence has wider acceptance. Therefore, there is a need to put ayurveda on a firmer scientific footing and to reap its full benefits integrating with modern medicine.

To the human body all medicines are just chemicals/molecules. Living organisms are unique in that they are self-replicating, self-adjusting, self-repairing and self-evolving systems. The human body is dynamic. All the molecules in our body are being continuously replaced by new molecules from the food that we eat. There are over 40-odd constituents (essential vitamins, amino acids, fatty acids and minerals) that are a must in our daily food for this process. Only when proper molecules are supplied through our food in ample measures day after day, can one expect that a healthy body will be built and sustained. Medicines are secondary to health; vital nutrients in food are primary to health.

According to the second law of thermodynamics, cosmic force drives the universe towards increase in entropy. Life is order and death is disorder. ‘Life is defeating entropy and death is victory of entropy, which is more natural’. Hence life is a miracle and aging, disease and...
death are certainty. Thus eating is as much a way of acquiring order, as it is a way of gaining energy for defeating entropy to sustain life.

Living organisms are not at equilibrium. Rather they require a continuous influx of free energy to maintain order in a universe bent upon maximizing disorder. Metabolism is an overall process through which living systems acquire and utilize the free energy they need to carry out their various functions. They do so by coupling the exergonic reaction of nutrient oxidation to the endergonic reactions required to maintain the living state. Plants acquire free energy from the sun through photosynthesis in which the light energy powers the endergonic reactions of carbon dioxide and water to form carbohydrates and oxygen. Animals on the other hand, acquire their free energy by oxidizing the food constituents from other organisms, through photosynthesis. The free energy generated is coupled to the endergonic reactions through the synthesis of high-energy phosphate compounds such as ATP. The catabolic products from food provide the building blocks for rebuilding the body with the help of its own DNA.

Photosynthesis and respiration are oppositely acting processes that act in concert to keep life in balance. Interestingly, both act to produce internally reducing molecules, NADH and NADPH, the driving force that sustains life. NADH is primarily the driving force to generate ATP, to meet the energy requirement. NADPH is the driving force for the synthesis of proteins, carbohydrates, lipids and nucleic acids to meet the growth requirements.

Life originated in primordial earth’s conditions, which included a reducing atmosphere in contrast to today’s oxidizing atmosphere. The primary elements carbon, hydrogen, oxygen and nitrogen that go to form the living system, largely existed in different forms than the present. Carbon existed as methane, which now exists as carbon dioxide. Hydrogen existed as hydrogen gas and today it exists as water. Oxygen existed as water and today it exists as oxygen gas. Nitrogen existed as ammonia and today it exists as nitrogen gas. It is particularly interesting to note that even today in the predominantly oxidizing atmosphere the entire metabolic process of the living system is tuned to create primarily the reducing molecules like NADH, NADPH, etc. to sustain life. The process infuses dead molecules with life and breath using the DNA.

The very act of respiration to derive energy from food for sustaining life, inevitably produces about 2% of reactive oxygen radicals called free radicals. Free radicals can attack and damage almost any vital molecules and structures in our body, irreversibly and permanently, causing disease and death. Free radicals are excellent examples of entropy at work. The breakdown of orderliness is inherent in the physical make-up of the universe and it is the core reason why our bodies deteriorate, and age over time. When entropy gains the upper hand, intelligence must wane.

The body has to constantly fight through the antioxidant defence systems and antioxidants in food to destroy these free radicals, that are continuously being produced in our body. There are several proteins and enzymes like superoxide dismutase, glutathione peroxidase, catalase, etc. and smaller molecules like vitamins C and E, that are efficient in scavenging free radicals. However, when the free-radical load increases beyond the antioxidant capacity, oxidative stress results, thus hastening the aging process and leading to various health problems that one is genetically predisposed to. The best way to deal with this is to keep the free-radical load to minimum.

With the complementary styles of functioning of plants and animals, the life on this planet is in balance. Plants accumulate more reduced molecules, whereas animal-derived food would contain more oxidized molecules. Therefore, vegetarian food is a healthier option.

From the above account it is clear that reduced molecules (antioxidants) capable of scavenging free radicals, provide vital support for life to go on. It is also clear that the plants are a richer source of such reduced molecules. Ayurveda has an immense store of knowledge acquired over thousands of years of experience, as to which plant has better healing capacity for certain organs and for specific diseases. Although it may have specific healing power, it may also provide the vital life-support as antioxidant.

If our contention that herbal medicines provide vital support to life through their antioxidant activity is right, then this provides a simple tool for its validation. There are several chemical methods that are available to measure total reducing power or antioxidant activity. The use of cyclic voltammetry for measuring the reducing power is an attractive proposition. The method can not only give the total antioxidant capacity in any ayurvedic formulation, but the voltammogram can also provide some clues on the types of molecules present.

The opinion expressed here is a biochemist’s viewpoint, to integrate modern medicine with our ancient traditional medicine. This is the need of the day. We would be naive to suggest that herbal medicine rests on simply its antioxidant capacity. Of course, they are likely to contain many ingredients that may have direct medicinal value. However, its antioxidant power may also be significantly contributing to its healing power, which is readily measurable.

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