Potential of Traditional Knowledge in the development of healthcare products

G G Gangadharan
Foundation for Revitalisation of Local Health Traditions (FRLHT)
No. 74/2, Jarakbande Kaval, Post. Attur, Via Yelahanka, Bangalore 560 064, Karnataka

Received 27 May 2004; revised 28 July 2004

Drug design in Ayurveda is viewed in this article in two perspectives. One based on Ayurvedic principles, which will be making use of modern technology as a compliment. The other one is the conventional and more practiced method of taking a lead from traditional knowledge developing it further to isolate a bio-molecule of definite action. This article recommends traditional knowledge based drug development.

Key words: Tridosha, Healthcare products, Drug design, Traditional knowledge, Drug development

IPC Int. Cl: A61K35/78; C7J1/00; C7J3/00; C7J15/00; C7J75/00

The principle of holism is the corner stone of Ayurveda. Ayurveda considers the living being (microcosm) as the replica of the larger universe outside—the macrocosm. The physician is a conveyer-belt between the two, where he/she selects such things from the outer universe and makes appropriate changes in it so as the body can assimilate it properly. The *Panchabhouthik* body, i.e. the body made out of five basic elements called *Prithivi*, *Ap*, *Thejas*, *Vayu* and *Akasham*, is kept in equilibrium with each other (which is the homoeostasis state of the body) by assimilation of such elements from outside, which is also made of these five basic elements.

To understand a situation in the body, which manifests as certain symptoms, knowledge of the physiological units of the body is essential. These units in Ayurvedic term are known as *Vata* (to move—the principle of movement), *Pitha* – (to change to heat—the principle of all chemical changes in the body) and *Kapha* (*Shlish* – Alingane – to keep together, to adhere, to promote bulk) and collectively known as “*Tridoshas*”. These are three basic pillars on which the science of Ayurveda is based.

**Ayurvedic Concept**

The drug development in Ayurveda uses following three principles:

*Ksheena Vardhayithavya* increases the depleted elements in the body. *Vridha Kshapayithavya* decreases the elements that are increased in quantity or quality and *Sama Palayithavya* maintains the equilibrium of the bodily elements. Any disease whether acute, chronic, degenerative, infectious or functional to occur in the body has to be preceded by one of the two conditions of *Ksheena* or *Vridha vastha* described above.

French scientist, Dr Claude Bernard, the father of experimental physiology, has explained this condition when he coined the word homoeostasis (internal environment). First time in the history of modern medicine the Cock’s postulation of organism based disease origin was challenged by this hypothesis. Dr Bernard proved that unless the body’s internal environment changes to a level where the equilibrium of the body is lost, no diseases can originate in the body. This probably was the first postulation from the modern science attesting the principles of *Tridoshas* in disease origination. The drug design in Ayurveda is based on the understanding of these, internal changes and how they can be corrected.

*Upasaya* is the word used in Ayurvedic paradigm to explain the effect of remedial measures. This includes; *Oushadham* = the medicines per se, *Anna* = the food that goes with the treatment, *Viharam* = the life style changes that is part of the treatment (*Oushadhanna Viharanam Upayogam Sukhavaham*).

As per Ayurveda, a drug does not act in isolation but it is an important part of total regimen which includes diet and life style changes. *Charaka* categorically says “Those who treat merely with formulations and not aware of the implication of Desa (the place of birth), Kala (the time of disease manifestation) *Prakriti* (psychosomatic constitution), etc. of the particular person will be committing mistakes in treatment.” Drug development in
Ayurveda has to be done keeping this background in mind. At the same time this should not limit us from developing new dosage forms, new delivery methods and bioactivation of raw drugs in a better way than traditionally available to us.

Charaka and all other Acharyas (experts) say that the formulations given by them are very limited and are applicable for limited conditions. These formulations need to be strictly followed only by those who are not able to understand the Ayurvedic drug design (Alpa Budheenam Upayogartham) and the Intelligent physician should take these formulations as examples only and should go beyond this for newer formulation by deleting, adding or changing the ingredients according to the given situations (Budhimatam Udaharana Matram & Idam alam Anuktartha jnanaya Jnanavatam).

This process of suggesting an Ayurvedic regimen is dependant on diagnosis. This can be achieved if we follow principles of Ayurveda. One has to study the various principles behind the treatment of each disease category to understand the principle of Ayurvedic drug design. Drug design as per Ayurveda treatment principles must address problems at three levels:

**Disease Level**
- To break the chain of pathogenesis
- To suppress disease condition
- To block progress
- To reduce complications or associated diseases

**Drug Level**
- To use drugs having opposite properties to that of diseases
- To enhance bio-availability, spread & penetration
- To choose dosage forms suitable to enhance absorption
- To suggest time of intake of the drugs to enhance its action

**Individual Level**
- To suit Prakriti of the person
- To suit local habitat & climate in which the patient resides

As per Ayurveda, a drug should have the following four qualities:

- **Bahukalpam**: it should have multiple actions e.g. while improving the peristaltic movement helps in digestion.
- **Sampannam**: the medicine should retain all its natural properties intact e.g. if the drug chosen is more than one year old, it may lose some of its potential and hence not Sampannam.
- **Yogyam**: is the appropriateness of the given medicine in a condition e.g. if a medicine chosen is very good in terms of quality, actions, etc. but is not the appropriate one for that condition then it is not Yogyam for that condition.

There are certain medicines which are strictly against diseases and can be used in the disease irrespective of the Prakriti, Desa and Kala, etc. of the person. These medicines are known as Vyadi Vipareetha. Like in diarrhoea, Padha (Cissampelos pareira Linn.) that is Shhambanam (anti-peristaltic), Acacia catechu Wild. (Khadiram) in skin diseases or turmeric (Curcuma domestica Valeton) in diabetics. These medicines act universally against the said diseases irrespective of the Dosha and other characters.

**Drug Development**

Drug development based on natural products is a fast growing area due to the limitations of developing new synthetic molecules based on the principles of active components or pure chemicals. In the conventional system, drug development is based on the pharmacokinetic and dynamics. Drug, according to this definition is a biologically active molecule, which can act or react with a biological unit in the body to bring in a well defined result within the given time. So drug in western medicine is like a bullet, aimed at a given target which will hit the target whether it is desirable or not. In other words it can be said that drug by this definition is drug without intelligence.

Whereas in Ayurveda a drug is that which will bring in lost equilibrium of the body and in the process correct the damages, brought by imbalance of the Doshas. Here the drug acts with intelligence. For example, when Triphala is taken as purgative, it removes the unwanted materials from the system, but does not in any way disturbs the intestinal flora in the process. Also, when the Triphala is taken in appropriate dose while improving the bowel movement, it also helps to improve eye sight, increases the immunity and has an antiaging property.

Combining the strengths of the knowledge base of traditional systems such as Ayurveda with the
dramatic power of combinatorial sciences and high throughput screening will help in the generation of structure-activity libraries. Ayurvedic knowledge and experiential database can provide new functional leads to reduce time, money and toxicity—the three main hurdles in the drug development. These records are particularly valuable since effectively these medicines have been tested for thousands years on people. Efforts are underway to establish pharmacoepidemiological evidence base to Ayurvedic medicines, safety and practice. Development of standardized herbal formulations is underway as an initiative of the Council of Scientific and Industrial Research (CSIR) New Millennium Indian Technology Leadership Initiative (NMITLI), randomized controlled clinical trials for rheumatoid and osteoarthritis, hepatoprotectives, hypolipidemic agents, Asthma, Parkinson’s disease, and many other disorders have reasonably established clinical efficacy.

A review of some exemplary evidence based researches and approaches has now resulted in wider acceptance of Ayurvedic medicines. Thus, the Ayurvedic knowledge database allows drug researchers to start from a welltested and safe botanical material. With Ayurveda, the normal drug discovery course of ‘Laboratory to Clinics’ actually becomes from ‘Clinics to Laboratories’-a true Reverse Pharmacology Approach. In this process, Safety remains the most important starting point and the efficacy becomes a matter of validation. Globally, there is a positive trend towards holistic health, integrative sciences, system biology approaches in drug discovery and therapeutics that has remained one of the unique features of Ayurveda. A golden triangle consisting of Ayurveda-Modern medicine – Science will converge to form a real discovery engine that can result in newer, safer, cheaper and effective therapies. It will be in the interest of pharmaceutical companies, researchers and ultimately the global community to respect the traditions and build on their knowledge and experiential wisdom.

Ayurveda Resources

Nearly 5,800 clinical signs and symptoms are available in Ayurvedic texts. Effects of season, time and environmental conditions as per Ayurvedic chronobiology principles need to be considered to advice life style modifications followed by dietary advice. More than 1200 species of plants, nearly 100 minerals and over 100 animal products comprise the Ayurvedic Pharmacopoeia. Thousands of single, multiple combinations and processed formulations are described in Ayurvedic literature along with details of drug actions. The extent of this database is very large and it can be best managed with help of suitable computer and software.

Drug Discovery

In the sequence of their appearance, the scientific disciplines involved in drug discovery were: chemistry, pharmacology, physiology, microbiology, biochemistry and molecular biology. It can be shown that new therapeutic classes of drugs like muscle relaxants, diuretics, L-dopa, antibiotics, recombinant proteins, monoclonal antibodies and others were generated on the basis of scientific opportunities rather than therapeutic need. All of these drugs were created within the confines of a chemical paradigm of medicine and drug therapy. We are now witnessing the entry of a new informational paradigm into medicine that is most prominently represented by genomic sciences. This paradigm will bring two important changes to the therapy of diseases. First, molecular biology has matured to such a degree that it can now study complex genomes and their functionality in complex organisms such as humans. Therefore, results from these studies no longer have to be translated into the context of medicine. They are already within this context. Secondly, drug therapy that used to be largely symptomatic will now aim at targets which are closer to the causes of diseases than previously. Therapeutic progress which used to be indirect conjectural and coincidental is about to become more directed, definitive and intentional. The future drug discovery will be more often based on intent rather than coincidence. Proper bioprospecting of medicinal sources will be an important factor.

Conclusion

In the new era of drug development based on natural products, there can be two paths—one the traditional (western) methods of drug discovery based on active principles, hit and trial method, and the other is intentional based on sound understanding of the paradigm of natural products action in the body based on Ayurvedic principles.

The latter one has got greater chances of success and also has lesser time bar for development as it is based on the clinical activity. Even here the health care product has to be divided into following categories:
1. Cosmeceuticals as against cosmetics: The product which brings in permanent physiological changes in the body e.g. – Kumkumadi Thailam for skin fairness. This can be of Over the Counter (OTC) type.

2. Neutraceuticals

3. Functional foods

4. Promotive medicines-like in the areas of free radical scavenging, antiageing, immunoenhancing, adaptogens, etc.

5. In the areas of structural diseases like chronic kidney diseases, Diabetic Retinopathy, etc. A package of management has to be developed where the drug will be an important component.

Ayurveda says that the knowledge of whole cannot be accrued from the knowledge of the part. This means that we have to take the medicine as whole and the person also as a whole. Charaka categorically disapproves treatment of the part. Ayurveda says there are two kinds of treatments: one is Suddha (pure) and the other one Asuddha (impure). In pure treatment, alleviating the disease will not become cause for any other disease. Impure treatment is curing the disease, may become causative factor for other diseases. This perfectionist approach of Ayurveda has to be highly appreciated. Ayurveda strongly believes that a medicine given to the body should be fully assimilable to become part of the bodily elements. Anything that cannot fit into the definition is not regarded as a medicine in Ayurveda.

The science of drug development in Ayurveda has to be seen from this broader framework so that a functionally superior healthcare product based on natural substances can be developed. The potential of traditional knowledge in contributing to the development of healthcare products of contemporary value is a gray area and has to be explored by well-informed Ayurvedic scientists if new products of any value have to be developed. The issue here is one of direction, not one of scientific capacity. Ayurveda and all other traditional knowledge systems are not in the mainstream science not because of their lack of internal strength or rigour but because of their politico social marginalisation. It is important to follow systems-theory and systems biology applications to facilitate the process.

Routine random efforts are not likely to increase the desired success rate of discovery while experiences indicate a modified collection policy offered better chances of discovery and development of agents for treatment.

Acknowledgement

Author thankfully acknowledges the suggestions given by Dr S N Venugopal, Mr Darshan Shankar and Dr Ashwini Mathur during preparation of the paper.

References