



Leveraging Traditional Knowledge for Drug Discovery

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Traditional medicine has long served mankind as the primary source of therapeutic aids. The significance of research in traditional medicine is increasingly realized as there is substantial evidence elucidating the prospects of follow-up research based on the use of traditional medicinal plants [1]. The scope and utility of traditional medicine research assume greater importance in the realm of healthcare of humankind. In spite of the great march of synthetic products into modern medicine, half of the world's medicinal compounds are still derived or obtained from plants. Some of the most important drugs which have revolutionized the modern medicare systems have been isolated first from the plants used in primitive or ancient society. These wonder drugs include the curare alkaloids [2], penicillin and other antibiotics, cortisone [3], reserpine [4], the veratrum alkaloids, podophyllotoxin and other therapeutic agents [5]. Considering the fact that natural compounds/active principles isolated from plants are more economical and may have a holistic effect, leveraging traditional knowledge for drug discovery is imperative. Well-known examples of such products are atropine, digoxin, and morphine. Natural products may also be used as building blocks for the synthesis 'semi-synthetic' drugs; this is the case with plant saponins that can be extracted and easily altered chemically to produce sapogenins for the manufacture of steroidal drugs. Furthermore, the traditionally used medicinal plants may give the chemical blueprints for the development of related synthetic drugs; for example cocaine from *Erythroxylum coca* which provides the chemical structure for the synthesis of procaine and other related local anesthetics [6]. Recently, andrographolides isolated from *Andrographis paniculata*, an integral part of traditional Indian and Chinese medicine has been used in a number of well-being and hepatoprotective formulations [7].

Today, drug development is entering an era of precision medicine centered on the analysis and interpretation of massive amounts of data. The ability to integrate, interrogate, model and interpret biological, chemical, pharmacological, genomic and clinical data holistically is the key to making more effective and truly customized medicines to fight disease. The reverse pharmacology approach based on the traditional use of several medicinal plants can be seen as an alternative method of validation. The same approach can be used for the identifying new biodynamic compounds or active principles with specific medicinal properties. The recent era of big data study, using computational techniques has ignored the invaluable results that could be interpreted from traditional knowledge. The gap lies in the proper validation of traditional knowledge through modern scientific methods which is the prerequisite for useful interpretation and wider acceptance of traditional medicine.

The incorporation of computational methods/algorithms in traditional and ethnobotanical data will lead to faster and more accurate interpretation of results. For example, estimation of informant consensus factor for a particular ailment category can be used to find leads for curing specific diseases. However, drug discovery through traditional knowledge has numerous challenges due to the plethora of historical and ethnobotanical texts describing myriads of applications of medicinal plants [8]. Thus, a research design involving lead generation from traditional knowledge, screening based on computational methods like molecular docking,

pharmacophore modeling, and molecular dynamics to identify potential leads and final validation of potential leads through biological studies can be an economical and time-saving approach for drug discovery.

Ultimately, the traditional knowledge and expertise should be approached, in respectful and ethnically-apposite ways that benefit the involved communities, without disturbing the community ecosystem. The research design must have social value and inculcate awareness to ameliorate health and socio-economic development of the community.

As the content of this issue clearly highlights, scientists at the interface of traditional medicine and naturopathy have been instrumental in directly developing new paradigms in drug discovery. The move towards integrating traditional medicine and naturopathy into the mainstream medicine can surely contribute to the multidisciplinary drug discovery enterprise. Advances in drug discovery through integrative approaches spawning new biochemical or biological understanding have particularly far-reaching effects. We are pleased to spotlight the significant breakthroughs being made by traditional medicine and naturopathy researchers towards well-being and drug discovery.

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