

## Drug Development in Unani System of Medicine: Reverse Pharmacological Approach

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### Abstract

Hippocrates (460-377) the father of medicine was the first person who gave status of science to USM (Unani system of Medicine). USM was developed first in an elaborated way by Arab scholar's viz. Avicenna, Al Zehravi, Rhazes etc. The system flourished in various countries like India, Iraq, Egypt etc. During the British rule the USM suffered a lot, but after independence of India it was recognized by the Indian parliament and steps were taken for its development and propagation. Drug development in USM using present parameters is necessary for its global acceptance. Clinical experiences, observations and available data in USM became the starting points for research in drug development. Drug development in USM under scientific parameters may be undergone through the reverse pharmacological approach. Reverse pharmacology can reduce the three major problems of cost, time and toxicity. Qarabadeen (Unani Pharmacopoeal document) play a vital role in drug development of USM. Now a day's drug development in USM has passed through nearly all phases from reverse pharmacology to the nanotechnology but still it is in budding phase. It has been already proved by the Renoved Unani philosophers, the Unani drugs are efficacious and safe but to prove it scientifically reverse pharmacology and all phases of clinical trial should be done on all Unani drugs in order to propagate data for safety and regulatory status. This paper will detail about the data and highlight how drug developments can be initiated through reverse pharmacology in USM.

**Keywords:** Drug Development, Unani Medicine, Reverse Pharmacology.

### INTRODUCTION

Human history is also the history of discovery of drugs. Since time immemorial our ancestors search not only for food but also for the cure of diseases through medicinal plants. This relationship between the plants and man has grown from time to time and many plants came into existence as medicines.<sup>1</sup> Today's medicine has roots in traditional knowledge. Traditional medicine exists in every continent of the globe and in every culture of the world. The most famous one are Unani (Galenic Medicine), Chinese medicine, Ayurvedic Medicine. During the period of king Assurbanipal 2000 years BC a first comprehensive Materia Medica was written which contains 250 vegetable drugs and 120 mineral drugs and around 1500 BC the Memorable Egyptian Papyrus 'Ebers' was

written which mention 700 drugs derived from plant, mineral and animal origin.<sup>2</sup> Drug Development is really a costlier and commercially a risky process. From the identification to marketing a new drug development takes minimum 10 years with a cost of 500 -1000 million US\$.<sup>3</sup> Reverse Pharmacology is the solution for time, Money and cost that is consumed in conventional drug Development.<sup>4</sup> Reverse pharmacology also called as target based drug discovery (TDD).<sup>5</sup>

### DRUG DEVELOPMENT THROUGH REVERSE PHARMACOLOGICAL APPROACH

Unani drugs are generally regarded as safe and are commonly used in many acute or chronic illness. Reverse pharmacology is defined as the science of integrating documented clinical experiences and experiential observations into leads by trans

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disciplinary exploratory studies and further developing these into drug candidates or formulations through robust preclinical and clinical research.<sup>6</sup> The scope of Reverse pharmacology is to understand the mechanism of action. Drugs obtained by the reverse pharmacology path are *Mucuna pruriens* for Parkinson's disease, *Nyctanthes arbortritis* for malaria, *Phyllanthus amarus* for hepatitis.<sup>7</sup> *Rauwolfia serpentina* for hypertension, Commiphora mukul as cholesterol lowering drug, *Bacoppa monnieri* as Memory enhancer.<sup>8</sup>

The various other examples of drugs developed by reverse pharmacological approach are *Papaverum somniferam* an analgesic works through opioid receptors<sup>9</sup>, *Strychnos nuxvomica* a CNS stimulant acts through Glycenergic receptors<sup>10</sup>, the clinical effects of *Curura tomentosa* is paralysis and it acts through neuromuscular block.<sup>11</sup> *Physostigma venenosum* is a poisen, its poisonous effects is due to anticholinestrace effect,<sup>12</sup> *Digital purpurea* works through Na<sup>+</sup> K<sup>+</sup>-ATPase.<sup>13</sup> The discovery of Artemisinin for malaria is a result of scientific work based knowledge from

Traditional Chinese Medicine (TCM) and presents best case for reverse pharmacology approach.<sup>14</sup>

### PHASES OF REVERSE PHARMACOLOGY IN USM

Reverse Pharmacology has a tremendous scope for new natural drugs and their derivatives. Reverse Pharmacology is a transdiscipline that is comprised of three phases:<sup>14, 15, 16</sup>

- Experiential phase includes strong documentation of clinical observations of the biodynamic effects of standardized Unani drugs by careful and accurate record keeping.
- Exploratory studies for tolerability, drug interactions, and dose range finding in ambulant patients of defined subsets of the disease and pre clinical should be done either on in vitro and in vivo models to evaluate the target activity.
- Experimental studies both basic and clinical need to be done at several levels of biological organization in order to identify and validate the reverse pharmacological correlates of Unani Drug safety and Efficacy.

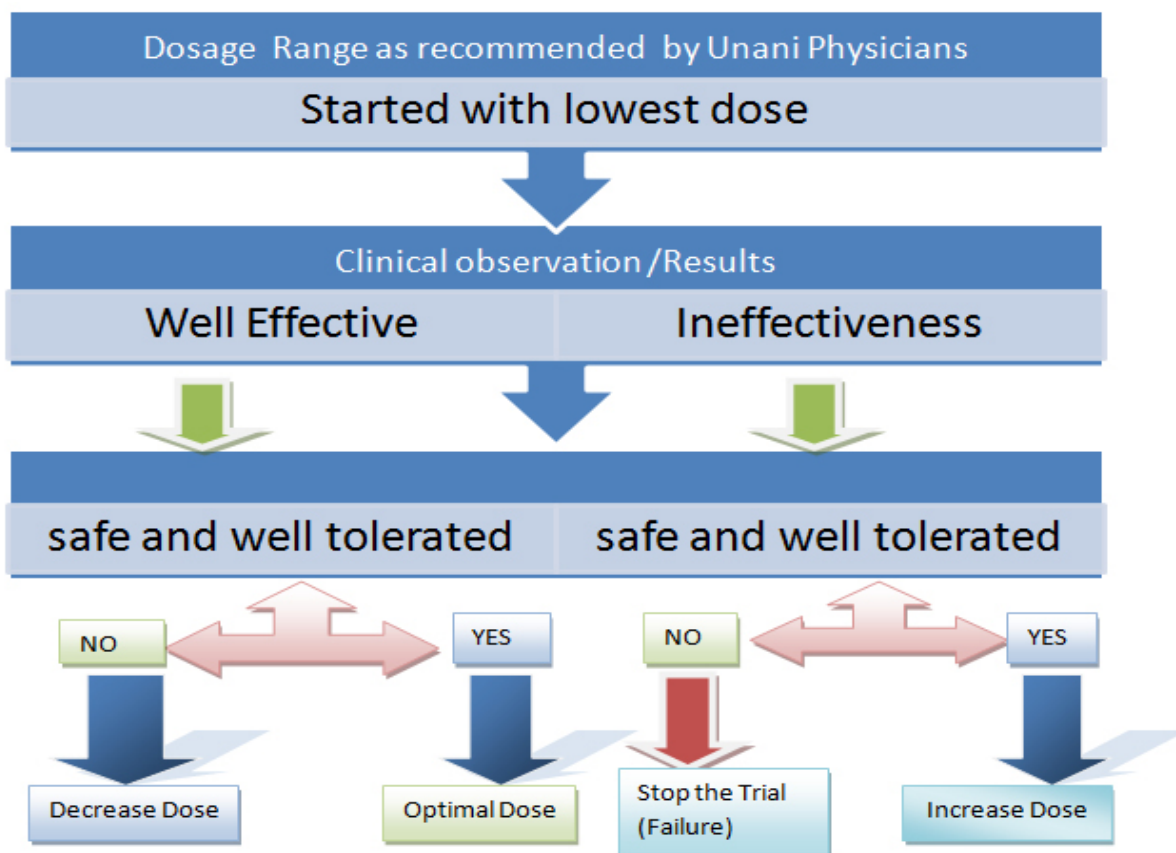


Fig. Drug optimization in case of Reverse Pharmacological Approach of Unani Drugs

### REVERSE PHARMACOLOGY HURDLES

WHO guidelines state that: "If the product has been traditionally used without demonstrated harm, no specific restrictive regulatory action should be undertaken unless new evidence demands a revised risk benefit assessment."<sup>17</sup> The majority of work done in the field of Reverse Pharmacology has remained within the clinics of Traditional or Unani Practitioners or it remains confined to academic research laboratories and has not been taken by drug industries which are strong in research and development. However the pharmaceutical industries need many more successes like artemisinin and reserpine. Many promising leads like curcumins and withanoloids are available but such Research and Development cannot proceed in isolation. Both the public and private sector partners comprising academia and industry should come together to acquire significant benefits from these evidently low fashionable but highly gifted observations based on traditional knowledge.<sup>14</sup>

### CONCLUSION

Globally there is an impressive need to create an educational atmosphere where the pharmacologist and clinicians work together in order to develop safe, effective and acceptable therapeutic agent through reverse pharmacological approach. Drug mechanism explained by reverse pharmacology, Pharmacoepidemiology, Retrospective treatment outcome survey, Whole system research can transfer the Unani system into evidence based medicine. Traditional 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 Unani medicines have been tested for thousands of years on patients and proved to be effective and safe. Thus, the novel approaches for drug development in Unani System of Medicine should be from 'Clinics to Laboratories', rather than the normal drug discovery course of 'Laboratory to Clinics', which will be a true drug development approach for its global acceptance. Reverse Pharmacology approaches need to be developed further and optimized as novel means for fast track drug discovery and development of newer, safer and effective drugs.

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