

# Prakriti Vis a Vis Pharmacogenomics, impact on drug design and development

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## Abstract

Ayurveda the science of life is based on some fundamental facts & principles. Prakriti is one of them. The study of prakriti & its association with diseases has been defined since Vedic period. But in modern era a new branch pharmacogenomics has been developed; depending upon human genome information. According to Ayurveda pharmacogenomics is nothing but a branch of prakriti.

**Key Words:** Prakriti, pharmacogenomics, Drug development.

## Introduction

Prakriti is a Principal factor or original source of Universe. Ayurveda -the science of life is based on some fundamental facts and principles having practical and philosophical base. According to this science whole universe and universal things are derived from prakriti or Avyakta. The study of prakriti and its association with diseases has been defined since Vedic period but elaborative description is available in Charaka and Susruta Samhita. Prakriti covers three aspects of life i.e. Anatomical, physiological and psychological.

In the modern era a new branch pharmacogenomics have developed as a result of hard work on human genome project, understanding role of genetic polymorphism in response to therapeutic drugs.

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This branch refers to complex interaction of genes across the whole genome and includes identifying candidate genes and polymorphisms correlating with possible therapies, predicting drug response and clinical outcome with less adverse effects and selection of therapeutic drug on the basis of genotype.

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Here in this paper an attempt has been made to prove that pharmacogenomics is not a new aspect but it has been told by our ancestors several Years ago, named as prakriti which is genetic constitution of a human affecting, drug design, prognosis etc.

## Aims & objects

To show scope of prakriti in Drug Design and Development

To draw conclusion that pharmacogenomics is noting but a small part of Prakriti.

To show importance of Prakriti in today's life.

## Definition of prakriti and pharmacogenomics

The word Prakriti is derived from "Pra + Kri" ?root. According to Amarkosha meaning of it is Natural disposition, Temper, Nature, and Constitution, Genital Organs of Male or female. Etc.

*Shukra Shonita Samyogai yo bhavaidosha utkata*

*Prikritirjayate tena tasaya mai lakshanam rinu (4/63)*

The doshas that are evoked during the union of Sukra and Sonita leads to formation of Prakriti

## Factors involved in prakriti formation

### Ayurvedic view

Prakriti of a child to be born is formed by the state of doshas in the Sukra and sonita of parents at the time of fertilization.

If the Doshas are in equilibrium-Uttama Prakriti.

If Two Doshas are dominant - Madhyam

Prakriti.

If one Doshas is dominant - Hina Prakriti.

### Pharmacogenomics

Pharmacogenomics is a new fields which includes the study of genetic variations between individuals and how these variation influence response to the therapy. One goal of this branch is to customize drugs for defined subpopulation of Patients. Its main implication is for improving rational drug development along with study of genetic variation in drug response.

According to Acharya Charaka four Factors are responsible for the formation of Prakriti .These factors has been presented in the (Chart no.1)

After seeing this classification deeply it can be understood very well that acharya has covered every aspect which can influence personality of an individual. In spite of this modern view preferably includes only genetic and biological factors. In modern view this process may be compared to the theory of Genes.

**Modern View** This view has been presented in the (chart no.2).

### Biological Factors

The anatomical features of an individual form one set of basic unit characters predetermined by hereditary characters and influenced to some extent by environment which together make up the constitution. Thus constitution is the aggregate of hereditary characters influenced more or less by the environment

### Type of Prakriti

This view has been presented in the (chart no.3).

According to modern geographically individuals are classified in to 5 groups.

Asian, European, African, Australian American

### Importance of Prakriti - (Drug Development and Design)

The Knowledge of Prakriti gives the quantum of any Vikriti, after determination of prakriti one can use the basic approach to treat any vikriti. The human constitution has an important role

in drug development. Though the identical twins looks physically similar yet differ in characters, temperaments etc.

Thus establishment of Prakriti is necessary to separate one individual from other.

Persons having different prakriti are exposed to some specific disease and need specific treatment

If the prakriti is kept in mind the appropriate treatment may improve course of disease, reduces the complications and finally prognosis may get changed.

E.g. if a person having Vataj prakriti suffers from Vataj disease it is difficult to treat. If he suffers form other doshas it is easy to treat.

All the acharya have given prime importance to examination of Prakriti. Even Acharya vaghbata has included Prakriti in Dashvidha Pariksha.

*Dushya desham balam kalamanalam prakritim vaya.*

*Satvam satamyam tatha aharamvasthasr prithikavidha.* (A.H.Su12/67)

Prakriti determination Plays important role in etiology of disease. E.g. if an individual of Pittaj Prakriti takes pitta provoking factors. He will be prone to pittaj diseases.

Prakriti has important impact on agni and kosta of individual. (e.g. Vataj prakriti -Krura kosta, visamagni, Kaphaj prakriti - Madhyama kosta, Mandagni.

### According to Dubey and Singh (1970)

Different prakriti have susceptibility to different. Type of disease.

Prakriti Disease susceptibility

1) Vatika - Infectious diseases like T.B., Rheumatic fever, anxiety disorders etc.

2) Pattika - Hypertension, I.H.D. Rheumatoid arthritis

3) Kaphaj - Obesity, osteoarthritis, Lipid disorders etc.

Effect of prakriti on dose fixation – Fixation of dose completely depends on prakriti. eg pitta prakriti people suffering from pittaj vikaras, requires the medicine in higher dose, as the

severity is more.

Effect On bioavailability : Pittahara drugs acts quickly on pitta Prakriti , because of high bioavailability.

Effect On Anupana : Anupana Should be decided according to prakriti. Anupana helps to potentiate bioavailability of drug depending on particular constitutions. (Table no.1)

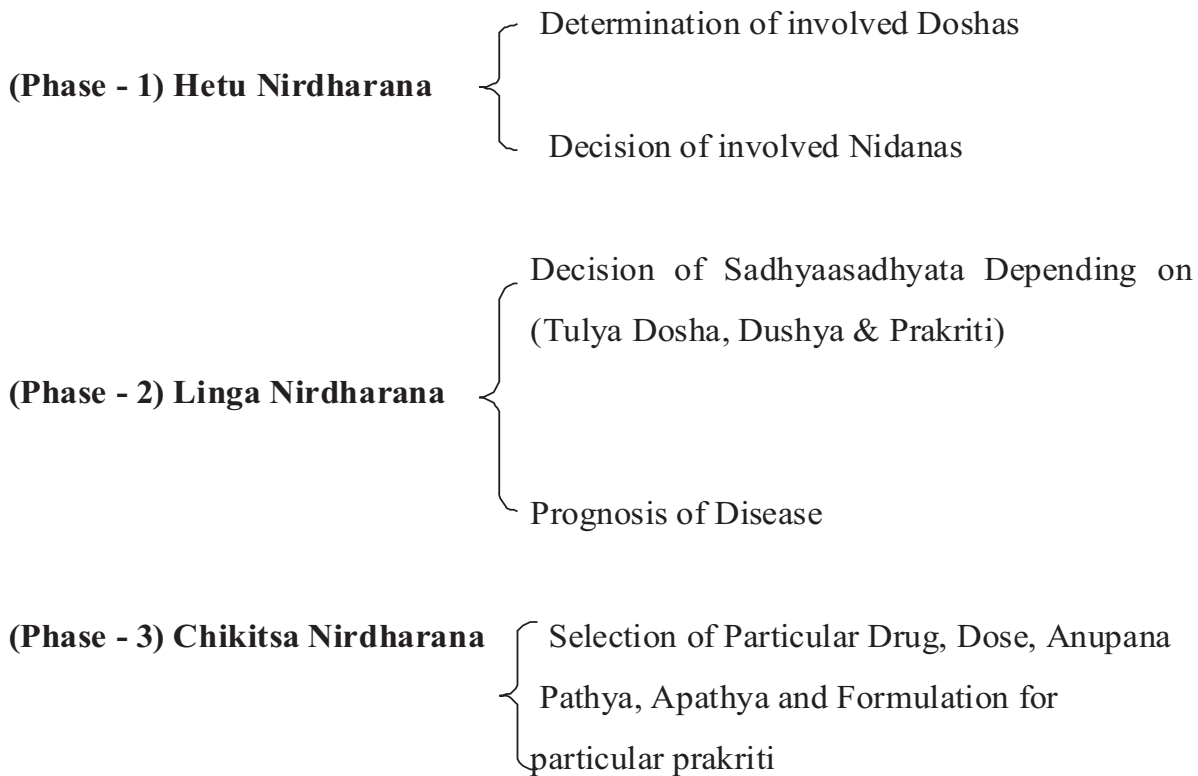
*Yatha tailam jale kshiptam kshanainava prasarpati*

*Anupanabaladangetatha sarpati bhesajam*  
(Sha.sam.M.Kh/5)?

### Effect on Pathya Apathya

Decision of pathya apathya should be done according to Prakriti

### Effect on deciding formulations



In the era of development of technologies, pharmacogenomics provides an integrated view of process such as drug metabolism pharmacokinetics and toxicology complementing molecular pharmacology.

This research has two main pathways-

Identification of new genetic targets associated with various diseases.

In samhita's different formulations of a single drug has been described. Formulations should be choused according to Prakriti.

E.g. in Pitta prakriti people suffering from pittaj vikara, medicine should be given in Ghrita form. It will get quickly absorbed and assimilable.

Thus we can say that selection of drug, drug response & dose at all need consideration of constitution. Hence whole concept of Health, Disease and Treatment is based on prakriti only.

### Phases of Prakriti Nirdharana

Identification of specific genetic polymorphism associated with responsiveness to particular drug.

Thus the first step includes on candidate gene approach that relies on prior knowledge of disease pathogenesis and pharmacological mechanisms of action of given drugs to identify genes and to compare the frequency of given genotype to drug response.

The Second step involves genome association studies that use high density markers to analyze relation between genetic allele and drug response phenotype. Steps to define pharmacogenomics have been presented in (Chart no.4)

### **Discussion**

Thus we can say that concept of prakriti has been described in Ayurvedic classics since very beginning with its high ideas. The constitution provides direct information of different and particular gene involvement, drug metabolic tendencies, receptors of a particular person, drug targets, efficacy and toxicity of medicines.

Every individual has a body and mind which is quite unlike that of any other. Hence knowledge of prakriti may help a physician to advice the patient a specific diet and regimen, and in healthy people's specific Ahara vihara which will improve his immunity for particular disease. In this way a particular line of treatment can be applied depending upon prakriti determination.

Thus pharmacogenomics is nothing but a part of prakriti nirdharana and its application.

Prakriti Nirdharana can emerge some potential opportunities which are as follows;

To know patient's, response to the drug.

To Develop particular prescriptions or drug regimen

To improve efficacy of drug.

To determining accuracy of appropriate dosage

To screen out certain disease.

To make a svastha purusha always healthy (physically, mentally & socially fit).

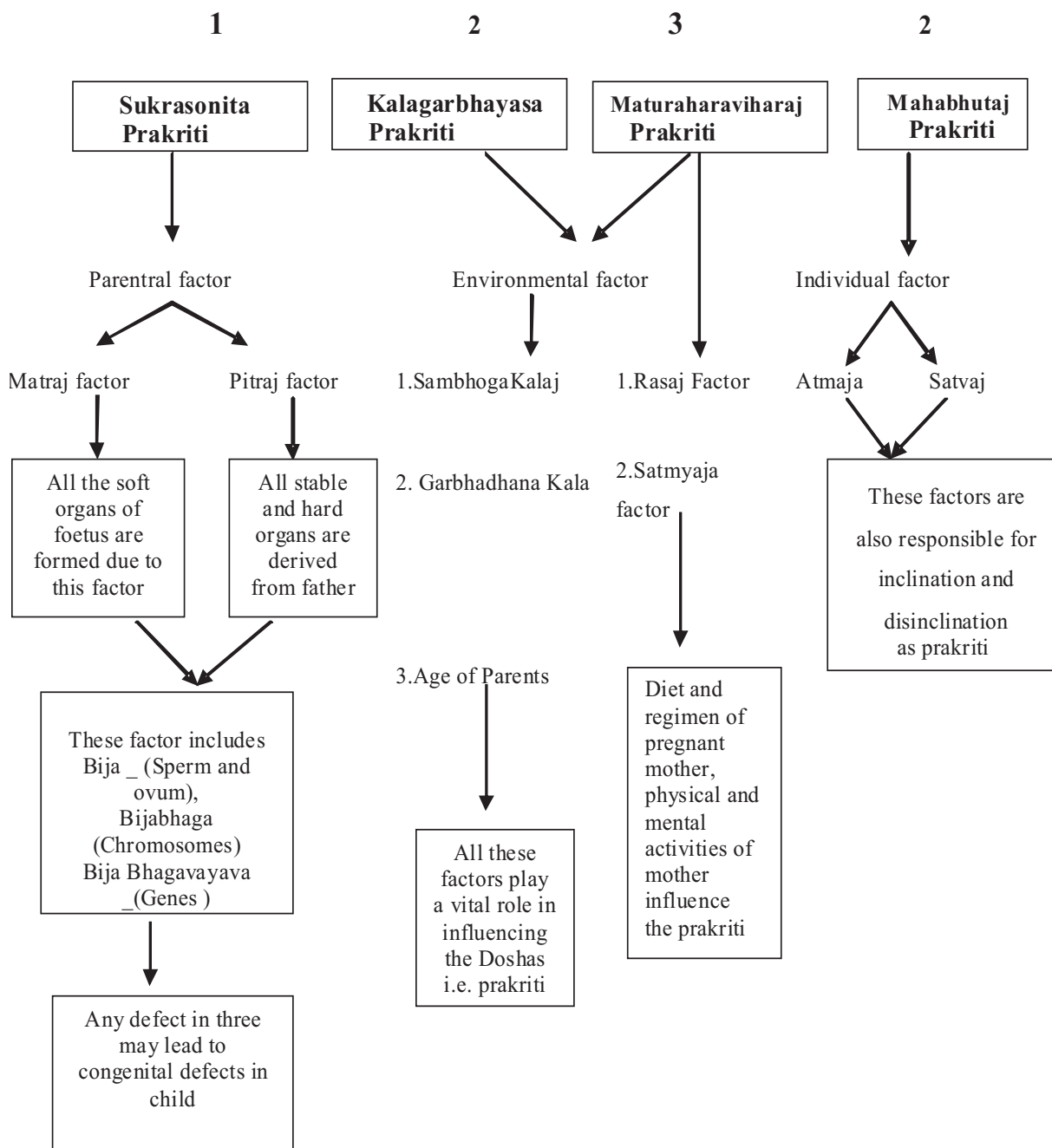
### **Conclusion**

Prakriti distinguishes and characterized a person apart from others and consists anatomical, physiological and psychological, make up of a person.

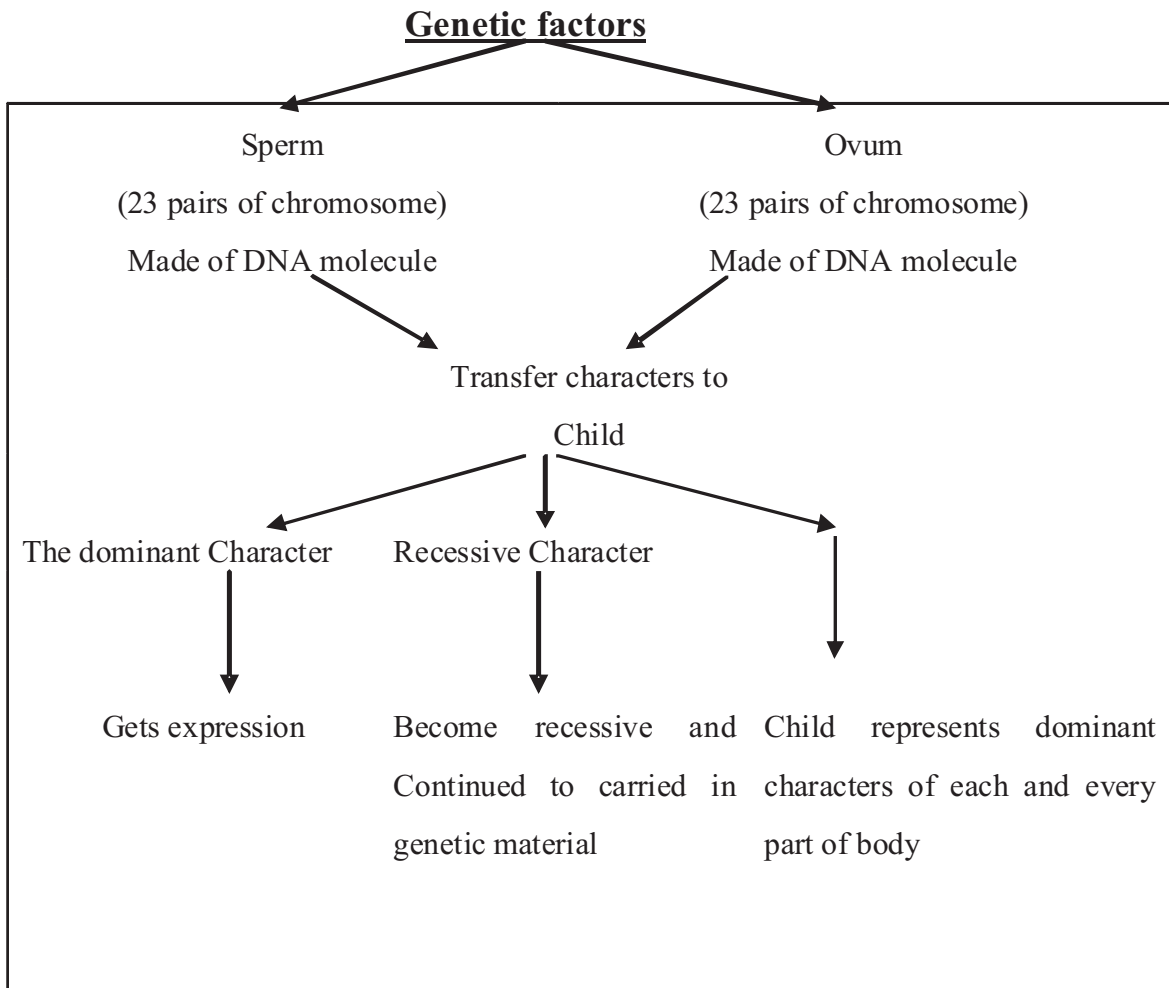
Prakriti is nothing but a human genome project applied by our Acharya to determine its influence on every aspect of life.

Pharmacogenomics can be understood as a part of prakriti developed by recent researches having a great impact on drug design and development.

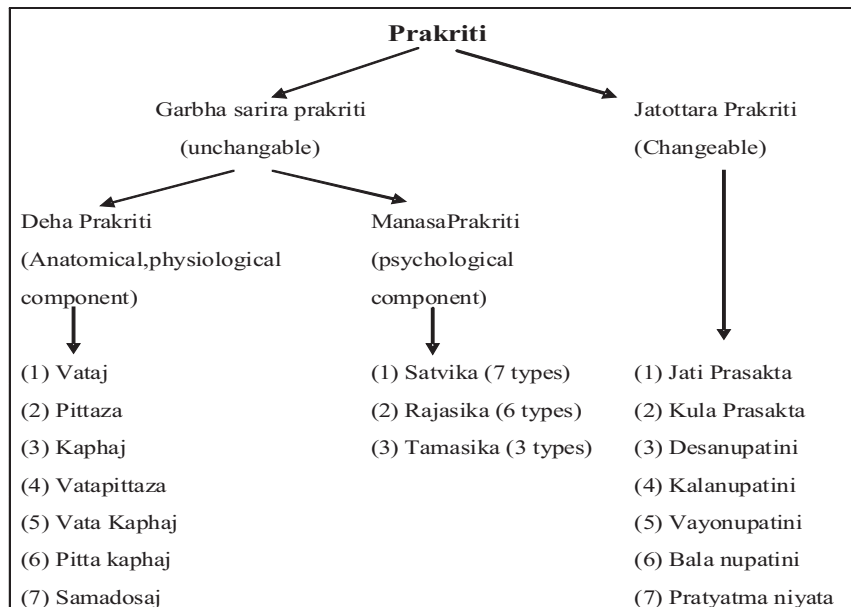
**Chart 1: Factors responsible for the formation of Prakriti  
According to Ācārya Charaka**



**Chart 2: Theory of Genes( Modern view)**



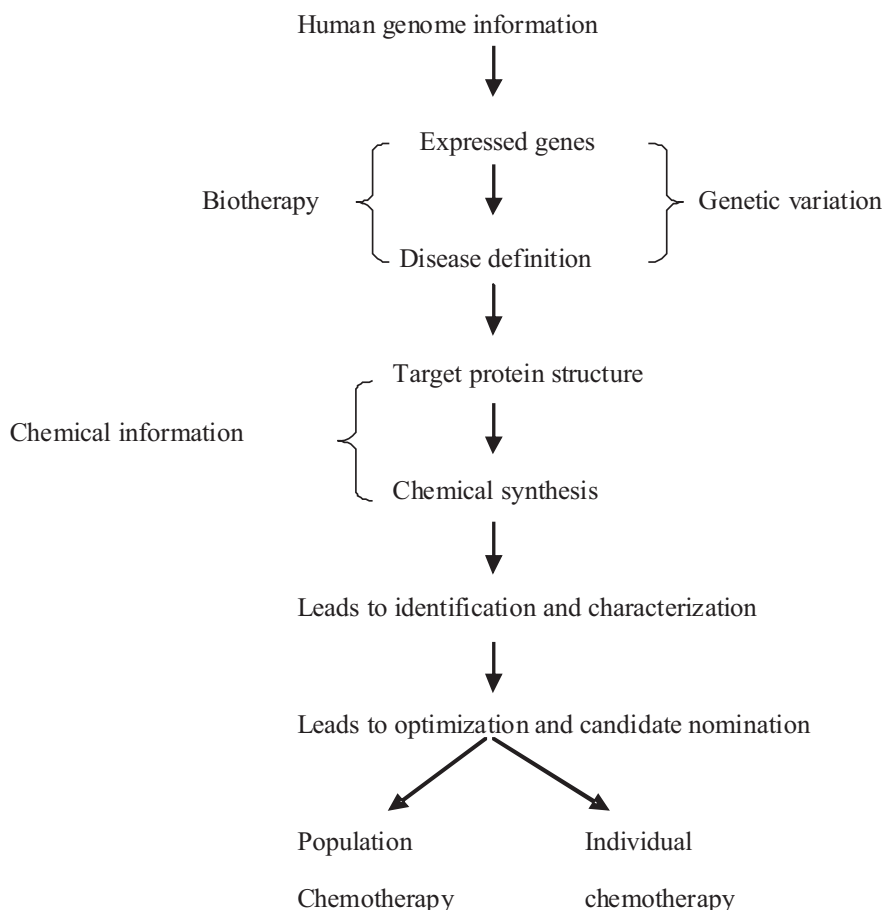
**Chart 3: Types of prakriti**



**Table 1: Selection of anupana according to prakriti**

Prakriti	Anupana
Vataj prakriti	Tail
Pittaj prakriti	Ghrita
Kaphaj prakriti	Madhu

**Chart 4: In short steps to define pharmacogenomics**



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