



Council of Scientific &
Industrial Research

Ayurgenomics Bringing age-old wisdom to the healthcare of the future

MODERN medicine has made tremendous strides in prolonging the human lifespan and improving the quality of life in the last 100 years. This has been achieved through a detailed study of diseases leading us to deep insights into symptoms and the discovery of a large collection of chemicals that alleviate these symptoms. However, in our quest to understand the disease, we had forgotten the patient and the inter-individual variability amongst them, even in a healthy state.

Our ancient system of medicine, Ayurveda, on the other hand, focuses on the individual. Much before personalised medicine became the vogue in public health discourse, Ayurvedic texts treated each individual as unique and disease as an interplay of multiple inherent and environmental factors. It has a basic tenet of predictive and personalised approach explained through Trisutra Ayurveda for healthy and diseased (Hetu- the causes; Linga- the features; and Aushadha-therapeutics).

At the start of this century, when DNA-based technologies became available for studying human genetic diversity and inter-individual variability, scientists at the CSIR-Institute of Genomics and Integrative Biology (CSIR-IGIB) saw an opportunity to explore if there was a genetic basis for the Prakriti-based stratification.

According to the Ayurvedic system, every individual is born with his or her basic constitution or Prakriti, which determines the inter-individual variability in health parameters, susceptibility to diseases and

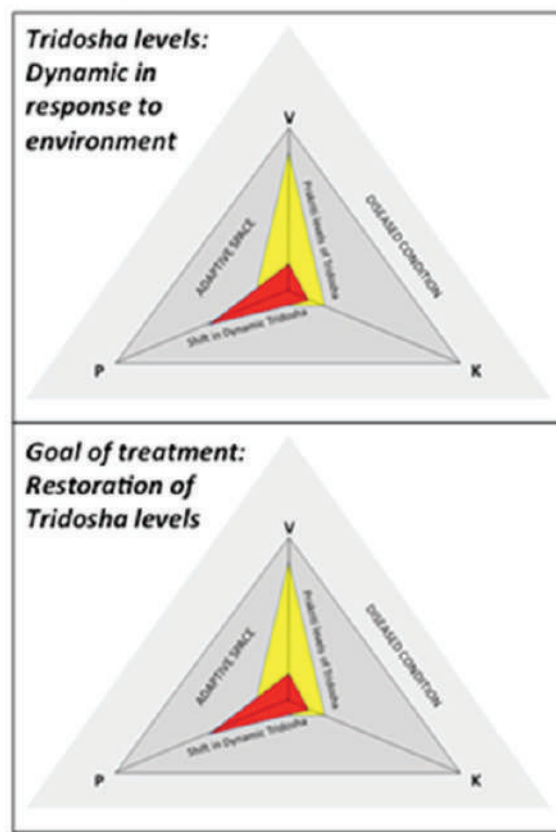
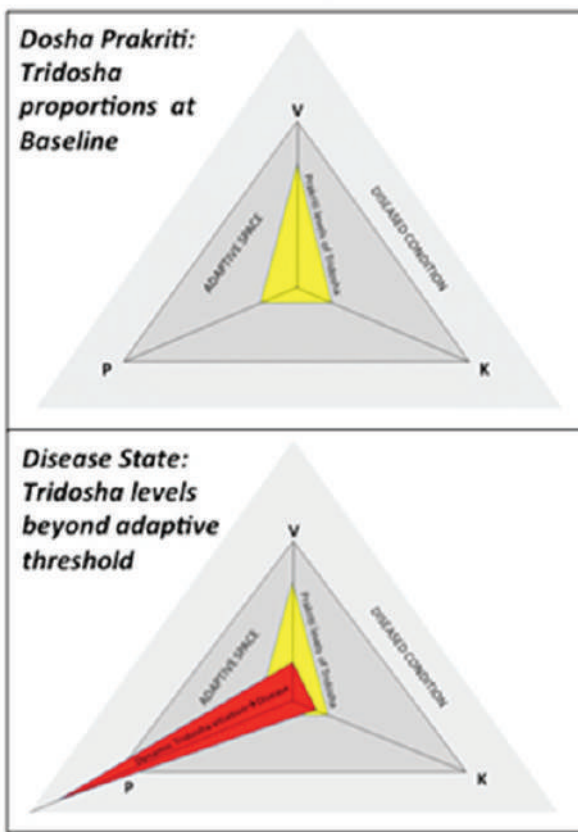
response to external environments, including diet, drugs and lifestyle.

There are seven Prakriti types of different proportions of three doshas, Vata, Pitta and Kapha but the three most contrasting types, with a predominance of either one, i.e. Vata, Pitta and Kapha, are the most vulnerable to diseases.

Modern medicine is now battling the rising cases of common diseases like diabetes, asthma, cardiovascular disorders and neurodegenerative diseases. Many of these require a lifetime of medical interventions and have variable drug responses. The target of predictive and personalised medicine is to understand the complex genetics of these diseases and identify factors that predispose individuals to these diseases and predict their progression and treatment outcomes. There are, however, no modern methods available to stratify inter-individual differences within ethnically matched healthy populations.

Integration of Ayurveda methods of Prakriti stratification with modern genomics, for the first time, led to the identification of the molecular and genomic basis of the concept of doshaPrakriti. The healthy individuals of contrasting Prakriti types, i.e. Vata, Pitta and Kapha identified based on Ayurveda, exhibit striking differences concerning biochemical and haematological parameters. Genomic studies revealed that the three Prakriti types also differed significantly in gene expression levels, especially of genes responsible for immunity, cell division, blood coagulation, etc.

Tridosha Variability in health & disease : Basis for personalized interventions



We were able to link a variation in oxygen sensor gene, EGLN1, to high altitude adaptation using this novel integrative approach of Ayurgenomics, population genetics, and disease genomics through clinical phenotyping of normal healthy individuals into Vata, Pitta and Kapha constitution types. Modulation in the levels of this gene was also shown to be relevant for hypoxic response and asthma severity in murine models by scientists of CSIR-IGIB. This is also being used to understand the susceptibility of individuals to high altitude sickness.

The Ayurgenomics study thus provides a novel molecular framework for integrating genomics studies to Ayurvedic principles of inter-individual variability and accelerating the discovery of markers for predictive, preventive, and personalised medicine.

Taking further the understanding of the modern biological basis of variability (Linga) and disease severity (Hetu) and to explore the therapeutic aspect (Aushadha) of Ayurveda, we have been able to tie in the use of Adathodavasica, or “Vasa”, a common herb described in Ayurveda to balance Pitta-Kaphadosha to many respiratory illnesses. In our studies with mouse models of asthma, we found a protective effect of Vasa as an anti-hypoxic and anti-inflammatory action. We further found that Vasa was protective against many models of airway inflammation, in addition to acute allergic and severe asthma. We then extended our studies to inflammation-related fibrosis

with positive results. These results have prompted us to study the potential of this herbal extract on the airway inflammation and fibrosis seen in COVID-19 patients.

The Ayurgenomics approach thus allows systematic exploration of Trisutra Ayurveda, harnessing the power of genomics and molecular phenotyping. Ayurgenomics could pave the road to a faster realisation of the goals of preventive and personalised medicine.

CSIR-TRISUTRA Unit (Translational Research and Innovative Science through Ayurgenomics) at CSIR-IGIB is an inter-disciplinary networked centre that enables cross-talk between Ayurveda, modern medicine and genomic science.

The Ministry of AYUSH has awarded CSIR-IGIB's Ayurgenomics initiative as a Centre of Excellence Grant for Applied developments of Ayurveda Prakriti and Genomics.

For more details on this novel integrative Ayurgenomics approach for integrative medicine and scientific achievements, please visit the website <https://Prakriti.igib.res.in/trisutra/posters.html>

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