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# Effect of *panamanian plants* on the biochemical targets of obesity, inflammation and metabolic disorders

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A collection of Panamanian plant extracts was evaluated throughout a series of target based cellular assays related to metabolic disorders such as Type II diabetes, hypercholesterolemia, inflammation, and obesity. The plants were supplied by CIFLORPAN to the NCNPR under an institutional Memorandum of Understanding and according to the Nagoya Protocol. The flora of Panama is one of the richest in the Neotropical area with an estimated of 10,327 vascular plant species, of which 13.4% are endemic. Panama has a higher density of plant species than bigger countries like Brazil, China, and the United States. The overall goal of this study was centered on four molecular targets: peroxisome proliferator-activated receptor (PPAR) isoforms (α and γ), liver X receptors (LXRs), nuclear factor kappa-B (NF-κB), and inducible nitric oxide synthase (iNOS). As a part of inflammatory pathway, activation of NF-κB leads to insulin resistance and by blocking this pathway, insulin resistance and the resultant T2DM can be prevented. In contrast, activators of PPARα and PPARγ are effective in lowering blood lipids and sugar and have been considered useful in the treatment of obesity and diabetes. Like the PPARs, LXR suppresses production of inflammatory mediators in a manner reciprocal to its regulation of lipid metabolism. Due to a close association of metabolic syndrome, with oxidative stress and inflammatory processes, there has been an increased interest in these molecular targets and the drugs affecting them are emerging as important class of therapeutic agents. Reporter gene assays were used to screen the plant extracts for their activity on PPARα, PPARγ, LXR and NF-κB while iNOS inhibition was determined in terms of nitrite levels in cell supernatants. A total of seventy-five plant species were evaluated for their biological activity towards the selected targets. Out of 83 plant extracts, 22 showed activation on PPARα and 15 showed activation of PPARγ. Eleven extracts showed dual activation of PPARα and PPARγ. Most of the extracts did not affect the viability of HepG2 cells and were not considered cytotoxic. In the NF-κB assay 17 extracts inhibited NF-κB mediated transcription with IC50 values in the range of 28-65 μg/mL. This was the first report of the inhibition of NF-κB by seven plants. On the other hand 26 plant extracts showed inhibition of iNOS and therefore they may have potential as anti-inflammatory properties. The current study shows that the Panamanian flora is still an untapped source of bioactive molecules directed toward the mitigation of metabolic abnormalities.

## Biography

Mahabir Prashad Gupta, born in India, he received his undergraduate and Master degree in pharmacy from the University of Rajasthan and Banaras Hindu University, respectively. After working in India for two years in an Indian Council of Medical Research Composite Drug Research Scheme, he continued his doctoral studies at Washington State University, Pullman, U.S.A. Immediately after receiving his Ph. D. degree he was awarded an Alexander von Humboldt Research fellowship which allowed him to carry out research on drug discovery from plants at the University of Munich. Currently, he is the Research Professor of Pharmacognosy and Founding Director of the Center for Pharmacognostic Research on Panamanian Flora at the University of Panama. He has done pioneer research on natural products in Panama and Latin America.

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