

Flavonoids: Little changes—large effects

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(Phys.org) —Scientists at the University of York have discovered that very small chemical changes to dietary flavonoids cause very large effects when the plant natural products are tested for their impact on the human immune system.

Plants are capable of making tens of thousands of different small molecules – an average leaf for example, produces around 20,000. Many of these are found in a typical diet and some are already known to have medicinal properties with effects on health, diseases and general well-being.

Now plant biologists and immunologists at York have joined forces to examine a very closely related family of these small molecules (flavonoids) to establish how tiny changes to their chemical structures affect their bio-activity.

The research, published in *The Journal of Biological Chemistry*, has important implications for diet and in the development of new pharmaceuticals from plant natural products.

Researchers from the Centre for Novel Agricultural Products (CNAP) and the Centre for Immunology and Infection (CII) in the University's Department of Biology designed experiments to test the [bioactivity](#) of plant-derived flavonoids.

Professor Dianna Bowles, a plant biochemist and founding Director of CNAP, led the research with Professor Paul Kaye, the Director of CII,

who developed the robust assay system involving [human cells](#) to assess the impacts of the different structures.

Professor Bowles, who referred to the research in a panel discussion on 'Nature's Marvellous Medicines' at the recent Royal Society Summer Science Exhibition, said: "We were measuring how flavonoids affected the production of inflammatory mediators by cells stimulated by [microbial products](#). We found that the way in which a flavonoid scaffold was decorated had massive effects on how the cells responded. If a methyl group was attached at one site, there would be no effect; methylate another site, and the cells would produce far greater amounts of these [inflammatory mediators](#). Therefore, the site of attachment on the structural scaffold was all-important in determining the bioactivity of the small molecule.

"Plant products in our diet have immense molecular diversity and consequently also have a huge potential for affecting our health and well-being. We are only at the beginning of discovering the multitude of their effects."

Professor Kaye added: "The research demonstrates the level of control that the shape of a molecule can have on its recognition by our immune system cells. This is really important since we can use information such as this to design new drugs for clinical use, as novel immunomodulators, for example".

The paper is titled "Regiospecific Methylation of a Dietary Flavonoid Scaffold Selectively Enhances IL-1 β Production following Toll-like Receptor 2 Stimulation in THP-1 Monocytes."

More information: www.jbc.org/content/288/29/21126.abstract

Provided by University of York

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