

Phytochemicals in health and inflammatory disease: epigenetic friends or foe

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Abstract

Today, complex chronic diseases, such as cancer, obesity and type II diabetes, cardiovascular diseases, neurodegenerative diseases, and aging are replacing worldwide morbidity and mortality from infectious diseases. In addition, various links have been established between diet and a range of chronic inflammatory diseases. Thus, nutrition research has shifted from focusing exclusively on alleviating nutrient deficiencies to preventing chronic diseases and composing manufactured functional foods with health protective properties. Only recently it has been observed that exposure to specific phytochemicals can affect gene expression via reversible epigenetic mechanisms and gets memorized in our “epigenome” through life. Epigenetic changes in DNA methylation patterns at CpG sites (epimutations) or corrupt chromatin states of key inflammatory genes and noncoding RNAs, recently emerged as major governing factors in cancer, chronic inflammatory and metabolic disorders. Reciprocally, inflammation, metabolic stress and diet composition can also change activities of the epigenetic machinery and indirectly or directly change chromatin marks. This has recently launched re-exploration bioactive food components for characterization of potential beneficial effects on epigenome modifying enzymatic activities. We will discuss how phytochemicals can mediate specific and/or global epigenetic changes in different models of inflammatory disease related to cancer-inflammation and/or vascular health. This may allow to improve healthy aging by reversing disease prone epimutations involved in complex inflammatory and metabolic disorders. The study presented is part of the European FP7 project FLAVIOLA(www.flaviola.org), the MMRF (www.themmrp.org) and an NOI-grant.