

# A sage discovery: Plant-derived compounds have potent anti-inflammatory effects

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New research reveals that two specific plant-derived compounds may be effective for fighting inflammation and pain. The findings are published in the *British Journal of Pharmacology*.

Diterpenoids are found in certain plants, fungi, and marine organisms, and two in particular—carnosol (CS) and carnosic acid (CA)—are known to interfere with multiple pathways in the human body associated with [inflammation](#) and pain.

A team led by Giuseppe Bifulco, PhD of the University of Salerno in Italy, and Andreas Koeberle, PhD of the Friedrich Schiller University Jena in Germany, have investigated the effects of these natural products in their pure form in [inflammatory pain](#) through research involving human cells and mice. The researchers found that the diterpenoids inhibited two enzymes involved in inflammation, fever, and pain. Overexpression of one of these enzymes has been observed in several [inflammatory disorders](#) as well as in many human tumors; the second enzyme is also a major player in inflammation and other immune-related processes in the body.

"We have demonstrated that 5-LO and mPGES-1, two key enzymes of inflammation, are primary targets of CS and CA, which are major bioactive ingredients of herbs that are used as spices—namely sage and rosemary—and in [traditional medicine](#)," said Dr Bifulco. "Our study provides comprehensive insights into their anti-inflammatory mechanism. Understanding both the [molecular basis](#) and

pharmacological relevance of natural products is essential to fully exploit the power of nature for human health."

The investigators noted that dual inhibitors of 5-LO and mPGES-1 are considered potential alternatives to classical anti-inflammatory and analgesic drugs that have well-documented side effects. Recently, the mPGES-1 inhibitor GRC 27864 (Glenmark Pharmaceuticals Ltd.) entered the first phase of clinical development.

"The discovery of new dual 5-LO/mPGES-1 inhibitors, like CS and CA, represents a valid strategy for the treatment of inflammatory and cancer diseases and further justifies the use of sage and rosemary in traditional medicine," said Dr Koeberle. "It is important that these [natural products](#) are tested in different experimental inflammation and cancer animal models as well as in imaging studies to obtain a complete comprehension of the molecular basis behind their observed biological activity."

**More information:** "In vivo and in vitro biological evaluation of the anti-inflammatory and analgesic response of carnosol and carnosic acid and in silico analysis of their target interactions." Francesco Maione, Vincenza Cantone, Simona Pace, Maria Giovanna Chini, Angela Bisio, Giovanni Romussi, Stefano Pieretti, Oliver Werz, Andreas Koeberle, Nicola Mascolo, and Giuseppe Bifulco. *British Journal of Pharmacology*; Published Online: July 28, 2016. [DOI: 10.1111/bph.13545](https://doi.org/10.1111/bph.13545)

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