

University of Naples Federico II Department of Pharmacy

PhD course Nutraceuticals, Functional Foods and Human Health

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## Natural hydrogen sulfide donors as new approaches in multiple inflammatory pathways

Hydrogen sulfide (H2S), is recognized as a signalling modulator endogenously produced within mammalian cells. It is formed from L-cysteine by the action of three enzymes: cystathionine- $\gamma$ -lyase, cystathionine-β-synthase, and 3-mercapto-pyruvate sulfurtransferase. H2S plays important roles in a variety of biochemical processes in physiological and pathological conditions (1). In this scenario, a functional role of H2S has been described in various cell types associated with innate immunity and adaptive immunity under normal conditions and in various inflammatory and immune diseases (2) . H2S levels are finely regulated to support inflammatory responses and can transduce signaling pathways leading to metabolic rewiring. H2S can also interact with various signaling molecules, such as ROS and NO, reducing oxidative stress in specific diseases including septic peritonitis, acute lung and myocardial injury, by modulating immune responses and reducing inflammation (3). H2S donors have demonstrated potential as therapeutic agents for various inflammatory conditions due to their antiinflammatory and protective properties. Therefore, the identification and characterization of new H2S-releasing molecules can represent a novel pharmacological strategy. In this view, natural H2S donors such as glucoerucin, glucoraphanin, diallyl trisulfide, and diallyl disulfide occurring in rocket, cruciferous vegetables, or garlic have shown remarkable biological activity (4). Besides, marine organisms represent a formidable source of bioactive molecules to be explored. In particular, Indonesian ascidian Polycarpa aurata has been identified as the first marine source of H2S (5). Based on this evidence, this project aims to identify new natural H2S donors derived from plants or marine organisms, either as purified compounds or extracts, this latter often more effective due to beneficial "synergistic" interactions. The anti-inflammatory, immunomodulatory activities, and the safety of new H2S donors will be evaluated in in vitro and in in vivo animal models.

## REFERENCES

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