



# MOLECULAR COMPOSITION OF ACTIVE CHIOS MASTIC GUM COMPOUNDS, TERPENES, FOR USE IN COSMETIC, NUTRACEUTICAL, MEDICAL DEVICES AND PHARMACEUTICAL APPLICATIONS

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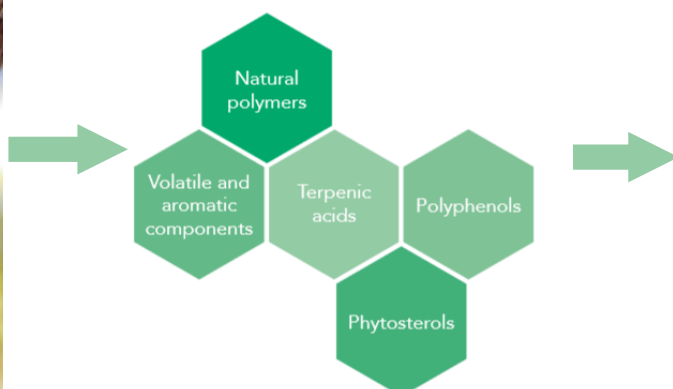
## INTRODUCTION

Chios mastic gum is a resin generated by the plant *Pistacia lentiscus* var. chia, generally cultivated in Mediterranean countries and particularly in the southern part of the Greek island of Chios. *P. lentiscus* is a very ancient plant and the related gum has been used since many centuries. Recent studies have associated specific pharmaceutical properties of Chios mastic gum with its particular molecular components. In fact, increasing scientific evidences are available on the therapeutic activity of Chios mastic gum. Its gastro-intestinal, antioxidant, anti-inflammatory, antidiabetic, antimicrobial and anticancer activity, as well as its beneficial effects in oral hygiene and in skin care are largely documented. In particular, it is used as a seasoning in Mediterranean cuisine, in the production of chewing gum, in perfumery, in dentistry, and for the relief of epigastric pain and protection against peptic ulcer.

Up to more than 70 constituents of Chios mastic gum have been found and more than 60 have been identified. Six components, namely  $\alpha$ -pinene,  $\beta$ -pinene,  $\beta$ -myrcene, linalool, *trans*-caryophyllene and camphene, account for 65% to 80% of the weight of the Chios mastic gum. The active components contributing to its therapeutic effects belong to the class of terpenes (mono- and sesquiterpenoids, triterpenic acids and triterpenoids). Triterpenic acids, in particular, possess various biological capacities such as anti-inflammatory, antioxidant, antiatherogenic, antihyperlipidemic, anti-tumor, antidiabetic and hepatoprotective effects. Chios mastic gum has been demonstrated to contain many of these active molecules such as oleanonic acid, moronic acid, 24Z-masticadienonic acid, 24Z-isomasticadienonic acid, 24Z-masticadienolic acid, 24Z-isomasticadienolic acid.



MORE THAN 80 COMPONENTS  
FOR A UNIQUE PRODUCT



| (m/z) <sup>-1</sup>                                | SPECIES   | Peak Number  |
|--|---|--|
| 453 C <sub>30</sub> H <sub>48</sub> O <sub>3</sub> | Oleanonic acid  | 42, 44, 52, 53                                       |
|  | Moronic acid  |  |
|  | 24Z-isomasticadienonic acid   |  |
|  | 24Z-masticadienonic acid  |  |
| 455 C <sub>30</sub> H <sub>48</sub> O <sub>3</sub> | Oleanolic acid  | 41, 47   |
|  | 24Z-masticadienolic acid  |  |
|  | 24Z-isomasticadienolic acid   |  |
| 469 C <sub>30</sub> H <sub>48</sub> O <sub>4</sub> | Enoxolone acid  | 20, 25, 26, 30, 31,<br>32, 34, 35, 37, 38,<br>41, 43 |
|  | Albasapogenin acid  |  |
|  | Coleonolic acid   |  |
|  | Glycyrrhetic acid   |  |
| 471 C <sub>30</sub> H <sub>48</sub> O <sub>3</sub> | Hederagenic acid  | 50   |
|  | Maslinic acid   |  |
|  | Corosolic acid  |  |
| 501 C <sub>30</sub> H <sub>48</sub> O <sub>6</sub> | If analyzed by tandem mass, the fragmentation pattern belongs to structural isomers of terpenic acids | 7, 8, 15, 27   |

## RESULTS AND DISCUSSION

To date, there is a substantial lacking of information concerning the fine structural molecular composition and characterization of Chios mastic gum and its derivatives to have a established structure/composition and effect/activity relationship to ensure consumers about its consumption. The present study deals with new recent analytical approaches useful for the determination of Chios mastic gum terpenes and evaluation of its quality. In fact, a qualitative and quantitative characterization of mastic gum biomolecules is of interest to "design" extracts having specific and powerful biological activities. Moreover, recent analytical techniques can be applied for the determination of typical fingerprints of mastic gum and a reliable identification of a large number of terpene components in extracts used in medicine and nutraceuticals. In our laboratory we developed and validated an analytical procedure for quantification of bioactive substances in Chios mastic gum, in particular HPLC-(UV)-ESI-MS (and tandem mass) for an accurate assessment of the content of these compounds. The present results prove that HPLC-(UV)-ESI-MS is an attractive tool for the identification of the main constituents of mastic gum and for qualitative and quantitative analysis of marker compounds as well as it may provide alternatives to classical analytical phytochemistry to screen commercial preparations of mastic gum and to evaluate specific nutraceutical benefits.

## CONCLUSION

In conclusion, due to its large heterogeneity, (Chios) mastic gum and its molecular components are not well characterized in relationship with the substantiation of biological activities and health benefits. However, based on its fine structural characterization and composition, further studies may generate novel mastic gum products possessing specific biological activities for new and specific applications able to produce a beneficial effect in one or more physiological functions, to increase well-being and/or decrease the risk of suffering from a particular medical condition.