Chlorogenic acid inhibits interferon-β release in LPS-stimulated human macrophages

Artusa V.[1], Ciaramelli C.[1,2], D'Aloia A.[1], Facchini F.A.[1], Gotri N.[1], Bruno A.[3], Costa B.[1], Palmioli A.[1,2], Airoldi C.[1,2], Peri F.[1]
E-mail: v.artusa@campus.unimib.it
[1] Dipartimento di Biotecnologie e Bioscienze, Università degli Studi di Milano-Bicocca, Piazza della Scienza, 4, 20126 Milano, Italy
[2] Milan Center for Neuroscience, Università degli Studi di Milano-Bicocca, Piazza dell'Ateneo Nuovo 1, 20126 Milano, Italy
[3] Laboratory of Innate Immunity, IRCCS MultiMedica, Polo Scientifico e Tecnologico, Via Gaudenzio Fantoli, 16/15, 20138 Milano, Italy

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Abstract:

Chlorogenic acid (5-CQA) is one of the most studied phenolic compounds in the last decade. It can be found in several foods and drinks, and it is well-known as a potent anti-oxidant[1]. In our study we focused on 5-CQA, as it is the major component of coffee extracts, investigating its immunomodulatory properties. We characterized the *in vitro* effects of 5-CQA pre-treatment in an LPS-induced inflammation model, using THP-1-derived human macrophages. We start assessing the amount of pro-inflammatory cytokines released in the medium after LPS challenge, in presence or absence of 5-CQA, through ELISA assays. What we observed, as a result of 5-CQA pre-treatment, was a dramatic dose-dependent decrease of interferon-β (IFN-β) release. Thus, we further investigate its molecular mechanism by Western Blot analysis. Despite our initial hypothesis, 5-CQA does not interfere with any of the signal transducers in between TLR4-IRF-3-axis, being IRF-3 even more phosphorylated at the end of the cascade in presence of both 5-CQA and LPS. Instead, STAT1 phosphorylation in response to the type I interferons signalling was reduced, as expected. In conclusion, 5-CQA pre-treatment leads to IFN-β release inhibition, which is reflected by a disruption of STAT1 phosphorylation. Taken together, our results could open the way to interesting new perspectives to investigate the efficacy of this coffee-derived natural compound in the treatment of those pathologies characterized by a persistent dysregulation of type I interferon production.

[1] Bagdas D, Gul Z, Meade JA, Cam B, Cinkilic N, Gurun MS. Pharmacologic Overview of Chlorogenic Acid and its Metabolites in Chronic Pain and Inflammation. Curr Neuropharmacol. 2020;18(3):216-228. doi:10.2174/1570159X17666191021111809