

Immunomodulatory Properties of Green and Roasted Coffee Extracts

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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-oxidant¹. In our study, we examined the anti-inflammatory role of coffee extracts on both MyD88- and TRIF-dependent pathways modulation in TLR4-stimulated immortalized and primary macrophages. We started assessing the amount of different pro-inflammatory cytokines released in the medium after LPS challenge, in presence or absence of GCE, RCE or 5-CQA, through ELISA assays. What we observed, as a pre-treatment result, was a dramatic dose-dependent decrease of released interferon- β (IFN- β). Moreover, GCE and RCE were able to diminish the nuclear translocation of IRF-3, the latter being the main nuclear factor inducing the transcription on the IFN- β gene. Thus, we further investigate this molecular mechanism by Western Blot analysis focusing on 5-CQA as a representative of coffee phenolic compounds. Despite our initial hypothesis, 5-CQA does not interfere with any of the signal transducers in between TLR4-IRF-3-axis, in fact IRF-3 was found to be 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 Neuroparmacol*. 2020;18(3):216-228. doi:10.2174/1570159X17666191021111809