

1 **Fatty Acid in *Cordyceps* and Flavonoids from *Houttuynia cordata* on**
2 **Immunomodulatory Effects Against Influenza A Virus**

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5 **Outline**

- 6 1. Introduction
- 7 2. Novel Fatty Acid in *Cordyceps* Suppresses Influenza A (H1N1) Virus-Induced
- 8 Proinflammatory Response Through Regulating Innate Signaling Pathways
- 9 3. Flavonoids from *Houttuynia cordata* attenuate H1N1-induced acute lung injury
- 10 in mice via inhibition of influenza virus and Toll-like receptor signaling
- 11 4. Conclusion

12 **Abstract**

13 Influenza is a viral infectious disease. Influenza can be categorized into four
14 types, namely A, B, C, and D, based on their protein antigens. Influenza typically
15 causes inflammation and lung damage during the infection process, while some
16 studies have found that traditional Chinese medicine are beneficial to these symptoms.
17 (2Z,4E)-deca-2,4-dienoic acid (DDEA) does not inhibit the primary target of the
18 influenza virus replication in A549 cells and U937 macrophages. DDEA showed a
19 significant inhibition on influenza A virus PR8-induced cytokine production in a dose-
20 dependent manner in A549 cells and U937 macrophages. DDEA inhibit the TLR-3,
21 RIG-I, and IFN signaling pathways activated by the influenza A virus. Flavonoid in
22 *Houttuynia cordata* (HCF) were identified as 8.8% rutin, 26.7% hyperin, 9.9%
23 isoquercitrin, and 31.7% quercitrin. HCF effectively reduced the mortality rate. HCF
24 alleviated lung inflammation and lung damage induced by influenza A virus in mice.
25 HCF inhibits viral NA activity and host TLR signaling, with hyperin and quercitrin
26 playing key roles in HCF. The novel Fatty acid from Chinese *Cordyceps* inhibits
27 proinflammatory cytokine expressions by disrupting the TLR-3, RIG-I, and IFN
28 signaling pathways activated by the influenza A virus. Flavonoid compounds in
29 *Houttuynia cordata* inhibit viral NA activity and host TLR signaling. These extracts
30 have potential therapeutic effects against influenza A virus.

References

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