Truffles contain endocannabinoid metabolic enzymes and anandamide

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Highlights

- The presence of the endocannabinoid system (ECS) is interrogated in truffles.

- Truffles contain anandamide and the major metabolic enzymes of the ECS.

- Anandamide content increases in the late stages of truffles' development.

Abstract

Truffles are the fruiting body of fungi, members of the Ascomycota phylum endowed with major gastronomic and commercial value. The development and maturation of their reproductive structure are dependent on melanin synthesis. Since anandamide, a prominent member of the endocannabinoid system (ECS), is responsible for melanin synthesis in normal human epidermal melanocytes, we thought that ECS might be present also in truffles. Here, we show the expression, at the transcriptional and translational levels, of most ECS components in the black truffle *Tuber melanosporum* Vittad. at maturation stage VI. Indeed, by means of molecular biology and immunochemical techniques, we found that truffles contain the major metabolic enzymes of the ECS, while they do not express the most relevant endocannabinoid-binding receptors. In addition, we measured anandamide content in truffles, at different maturation stages (from III to VI), through liquid chromatography–mass spectrometric analysis, whereas the other relevant endocannabinoid 2-arachidonoylglycerol was below the detection limit.

Overall, our unprecedented results suggest that anandamide and ECS metabolic enzymes have evolved earlier than endocannabinoid-binding receptors, and that anandamide might be an ancient attractant to truffle eaters, that are well-equipped with endocannabinoid-binding receptors.