

Angiotensin converting enzyme inhibitory activity in the mealworm *Tenebrio molitor* (Coleoptera, Tenebrionidae) protein hydrolysates

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Hypertension is well known as one of the major risk factors for cardiovascular disease. The angiotensin converting enzyme (ACE) plays a key role in blood pressure regulation process. Hypertension treatment by synthetic ACE inhibitors (e.g. captopril, lisinopril, enalapril) is effective but their use can cause serious side effects, such as hypotension, cough, reduced renal function and angioedema. Therefore, research was focused on natural ACE inhibitory peptides sources such as foodstuffs and recently, also insects promoted by the Food and Agricultural Organization of the United Nations (FAO) as a more environmentally sustainable, nutritious and functional alternative food to conventional livestock for human consumption. The purpose of this study is to investigate the ACE inhibitory activity in protein hydrolysates derived from the larval and pupal stages of the edible insect *Tenebrio molitor* (Coleoptera: Tenebrionidae). Each insect protein extract was hydrolyzed by the gastrointestinal enzymes (pepsin, trypsin and chymotrypsin) to simulate digestive process and compared to the crude extract. ACE inhibitory activity was measured by an indirect assay method based on the quantity of hippuric acid released by ACE from hippuryl-L-histidyl-leucine and determined by reverse-phase high performance liquid chromatography. Captopril was used as positive control and ACE inhibition degree expressed as the concentration of protein extract that inhibits 50% of ACE activity (IC<sub>50</sub>), assuming that the activity of the blank is equal to 100%. The IC<sub>50</sub> value of captopril was 2.6x10<sup>-6</sup> mg/mL. A significantly lower IC<sub>50</sub> was detected after gastrointestinal hydrolysis of the protein extracts obtained from larvae (0.720 vs. 0.097 mg/mL after gastrointestinal hydrolysis) and pupae (0.484 vs. 0.132 mg/mL after gastrointestinal hydrolysis). Based on experimental data, *T. molitor* larvae represent the most promising development stage for the purification and identification of bioactive ACE inhibitory peptides, confirming the potential benefits of this coleopteran for human health.

Biography

Dr. Annarita Cito (PhD) is a Post-doctoral Researcher at CREA-Research Centre for Agrobiolgy and Pedology in Florence (Italy), on the evaluation of the potential use of the edible insect species *Tenebrio molitor* and *Galleria mellonella* as human diet supplement of polyunsaturated fatty acids and ACE inhibitory bioactive peptides for cardiovascular disease prevention. She has expertise in cardiovascular disease mechanism and prevention. Currently, she is conducting research, as a Post-doctoral Researcher at CREA-Research Centre for Agrobiolgy and Pedology in Florence (Italy), on the evaluation of the potential use of the edible insect species *Tenebrio molitor* and *Galleria mellonella* as human diet supplement of polyunsaturated fatty acids and ACE inhibitory bioactive peptides for cardiovascular disease prevention.

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