蜂王蛹蛋白質水解物之抑制血管收縮素轉化酵素活性之研究

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摘 要

本研究以生產蜂王乳過程中產生之蜂王蛹(bee pupa)為材料，在進行冷凍乾燥後，利用硫酸銨飽和度沉澱法劃分蜂王蛹蛋白質，並利用商業酵素(alcalase及flavourzyme進行不同酵素/基質比之蛋白質水解，以探討蛋白質水解物對血管收縮素轉化酵素(angiotensin converting enzyme,ACE)之抑制活性。

研究結果顯示：

1.經過硫酸銨沉澱劃分之蜂王蛹蛋白質，收集20-100%飽和度之蛋白質，結果顯示，主要蛋白質的分子量約為50-35kDa。

2.本研究利用兩種商業酵素(alcalase和flavourzyme)進行蜂王蛹蛋白水解，使用1.5% alcalase水解10小時之後，其水解率為9.31%，ACE抑制率為40.85%；使用2.0% flavourzyme水解10小時之後，水解率可達7.98%，ACE抑制率為34.65%。使用1.5% alcalase及2.0% flavourzyme進行兩階段水解，先以1.5% alcalase水解10小時，再加入2.0% flavourzyme進行水解4小時後，其水解率為9.68%，ACE抑制率為73.29%。

3.將ACE抑制率較高之水解物進行膜過濾(MWCO 5000及1000)，分子量在5-1kDa之alcalase、flavourzyme及二階段水解物之ACE抑制率分別為65.39、56.42及82.01%，IC50分別為24.07、29.94及12.89 mg/ml。

4.取具有較高ACE抑制率之蜂王蛹蛋白水解物及膜過濾後之區分物進行體外模擬胃腸道水解，其結果為alcalase水解物之ACE抑制率上升至50.01%，而其5-1kDa及1kDa以下之區分物抑制率分別上升至74.16及72.54%；flavourzyme水解物ACE抑制率則下降至27.89%，而其5kDa以上及1kDa以下之區分物抑制率分別下降至24.88及53.33%；二階段水解物之ACE抑制率則上升至79.53%，其5kDa以上、5-1kDa及1kDa以下之區分物之抑制率分別上升至84.17、89.34及88.19%。

5.將具有最高ACE抑制能力之二階段水解物，其分子量在5-1kDa之區分物進行膠體過濾層析，將所得尖峰劃分為Peaks I(tube no. 34-64)、Peaks II(tube no. 47-59) 及Peaks III(tube no. 60-80)，共3個尖峰群，各尖峰群之ACE抑制能力以Peaks II具有最高抑制能力，達86.03%。

關鍵詞 : 蜂王蛹、血管收縮素轉化酵素、蛋白質水解物、ACE 抑制劑、酵素水解、膠體過濾、超過濾

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