Structural and biochemical studies on human salivary carbonic anhydrase VI

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Abstract

Periodontal disease, dental caries, and salivary gland malignancy are common and serious conditions that significantly impact public health. Human carbonic anhydrase VI (HCAVI) has been shown to play an important role in the pathology of these diseases. Therefore, it represents a potential therapeutic target for the development of novel therapies of these conditions.

This study aims to identify HCAVI novel inhibitors using biochemical studies combined with gene expression tools.

A set of selected drugs and natural products in addition to *Aesculus hippocastanum* plant extracts were screened for their HCAVI inhibition using the colorimetric esterase assay and cell-based assays. Captopril and miconazole that are non-sulfonamide showed promising activity. In addition, alcoholic fruit shell *A. hippocastanum* extracts and the natural product trans-cinnamic acid were identified as HCAVI inhibitors with moderate inhibitory activity.

To further investigate the effect of these inhibitors on HCAVI, quantitative reverse transcription-polymerase chain reaction (qPCR) assay were done using Hela cell- line. The qPCR showed that the miconazole and quercetin negatively affect the *HCAVI* gene by decreasing the fold change of this gene and downregulation of *HCAVI* gene shows at 100 μM, while the rutin, alcoholic fruit and fruit shell, aqueous fruit, and ferulic acid shows the highest upregulation of *HCAVI* gene when tested at the same concentration. These findings ding suggested the potential of identified hits in the pathologies associated with HCAVI anomalies.