

# Purification and Mechanism Analysis of Dipeptidyl Peptidase-IV (DPP-IV) Inhibitory Peptides from Fish Skin Collagen Hydrolysates

宋普騰 (5135)

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## Outline

1. Preface
  - (1) Diabetes and the synthesis of dipeptidyl peptidase-IV inhibitors
  - (2) Enzyme inhibition kinetics
  - (3) Molecular docking
2. Purification and mechanism analysis of active peptides of DPP-IV in fish by-products
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3. Conclusion

## Abstract

Diabetes is one of the top ten causes of death in Taiwan, of which type 2 diabetes (T2D) is the most important and is caused by insufficient or ineffective use of insulin in the body. Inhibition of dipeptidyl peptidase IV (DPP-IV) is considered one of the treatments for T2D. Medications that inhibit DPP-IV may cause side effects such as headaches and upper respiratory tract infections. Therefore, the search for natural sources of food-borne inhibitors is attracting attention. The purpose of this study was to use enzymes to hydrolyze collagen from salmon skin and tilapia skin, purify and identify the peptide sequences that had the ability to inhibit DPP-IV activity, analyze their inhibitory activities through *in vitro* experiments, and subsequently, molecular docking simulation was used to analyze the mechanism of bioactive peptides on DPP-IV. Research showed that after trypsin hydrolysis of salmon skin collagen for 300 minutes, the inhibitory activity reached 66.12%. Molecular docking results indicated that the peptide LVKDFR was identified as having the highest activity and effectively binding to the active site of DPP-IV. After tilapia skin collagen was hydrolyzed by papain for 6 hours, it was shown to have inhibitory activity against DPP-IV. Molecular docking identified the peptides KPAGN and GPLGAL, and GPLGAL can form hydrophobic interactions with residues (Tyr662、His740、Tyr666 and Ser630) in the S1 active site. Also forms hydrogen bonds with Arg125 and Phe357 in the S2 active site. In summary, both salmon skin and tilapia skin collagen can produce bioactive peptides with high DPP-IV inhibitory activity after enzymatic hydrolysis, providing a potential natural treatment source for T2D.

1 參考資料

- 2 Jin, R. ; Teng, X. ; Shang, J. ; Wang, D. ; Liu, N. Identification of novel DPP-IV  
3 inhibitory peptides from Atlantic salmon (*Salmo salar*) skin. *Food Research*  
4 *International*. 2020, 133, 109161.
- 5 Chen, J.; Ji, H.; Luo, J.; Zhang, D.; Liu, S. Two novel angiotensin-converting enzyme  
6 (ACE) and dipeptidyl peptidase IV (DPP-IV) inhibiting peptides from tilapia  
7 (*Oreochromis mossambicus*) skin and their molecular docking mechanism. *Journal*  
8 *of Food Science*. 2024, 89, 3603–361