白點症病毒結構性蛋白質VP41B(ORF298)之特性分析

葉鈺君、note

E-mail: 345898@mail.dyu.edu.tw

摘 要

白點症病毒（White spot syndrome virus, WSSV）為目前世界各地養殖蝦類中最具危害性之病毒性病原體，此病毒會造成蝦類與甲殼類動物造成高死亡率及嚴重的經濟損失。此病毒為一大型雙股DNA病毒，目前已有58個結構性蛋白質被鑑定出。本研究以針對白點症病毒之結構性蛋白質VP41B（WSSV-TW ORF298）進行特性分析，白點症病毒結構蛋白質vp41B基因，包含903鹼基，可轉譯出300個胺基酸，預測其分子量為41kDa。VP41B重組蛋白質已表現，並利用重組蛋白質製備VP41B抗體。經西方墨點法分析病毒蛋白組成結果顯示VP41B為病毒外套膜蛋白，並在病毒拓璞學分析中顯示VP41B為位於外套膜內層之蛋白質。利用酵母菌雙雜交系統分析中發現VP41B會與12個白點症病毒結構性蛋白質具有交互作用，並大部分蛋白質為外套膜蛋白質；並且VP41B會與自體具交互作用現象，形成多種類型的聚合體；並且VP41B會與草蝦受體蛋白pmCBP、pmRACK1、 與F1 ATP synthase beta subunitbeta subunit beta subunit 具有交互作用。根據以上研究結果顯示VP41B可能對於白點症病毒之組成與細胞辨識扮演重要作用，進而幫助病毒進入到宿主細胞中。

關鍵詞 : 白點症病毒、VP41B、結構性蛋白質、交互作用

目錄

參考文獻

1. 周宗錄，2007。蝦白點症病毒VP51A（ORF294）之特性分析。私立大葉大學分子生物科技系碩士論文。 2. 熊慧叡，2010。白點症病毒VP11（ORF394）之特性分析。私立大葉大學分子生物科技系碩士論文。 3. 趙梓霖，2010。白點症病毒VP38A（ORF314）之特性分析。私立大葉大學分子生物科技系碩士論文。 4. Campadelli-Fiume G, Amasio M, Avitabile E, Cerretani A, Forghieri C, et al. (2007) The multipartite system that mediates entry of herpes simplex virus into the cell. Rev Med Virol 17: 313 – 326. 5. Chang, P. S., Lo, C. F., Wang, Y. C., and Kou, G. H. (1996) Identification of white spot syndrome associated baculovirus (WSSV) target organs in shrimp, Penaeus monodon, by in situ hybridization. Dis Aquat Org 27:131-139. 6. Chang, J., Yang, S. H., Cho, Y. G., Hwang, S. B., Hahn, Y. S., and Song, Y. C. (1998) Hepatitis C virus core from two different genotypes has an oncogenicpotential but is not sufficient for transforming primary rat embryo fibroblasts in cooperation with the H-ras oncogene. J Virol 72:3060-3065. 7. Chang Y-S, Liu W-J, Lee C-C, Chou T-L, Lee Y-T, et al. (2010) A 3D Model of the Membrane Protein Complex Formed by the White Spot Syndrome Virus Structural Proteins. PLoS ONE 5(5): e10718. doi:10.1371/journal.pone.0010718 8. Chazal, N. & Gerlier, D. (2003). Virus entry, assembly, budding, and membrane rafts. Microbiol Mol Biol Rev 67, 226 – 237. 9. Chen, L. L., Leu, J. H., Huang, C. J., Chou, C. M., Chen, S. M., Wang, C. H., Lo, C. F., and Kou, G. H. (2002a) Identification of a nucleocapsid protein (VP35) gene of shrimp white spot syndrome virus and characterization of the motif important for targeting VP35 to the nuclei of transfected insect cells. Virology 293:44-53. 10. Chen, L. L., Wang, H. C., Huang, C. J., Peng, S. E., Chen, Y. G., Lin, S. J., Chen, W. Y., Dai, C. F., Yu, H. T., Wang, C. H., Lo, C. F., and Kou, G. H. (2002b) Transcriptional analysis of the DNA polymerase gene of shrimp white spot syndrome virus. Virology 301:136-147. 11. Chen, K. Y., Hsu, T. C., Huang, P. Y., Kang, S. T., Lo, C. F., Huang, W. P., and Chen, L. L. (2009). Penaeus monodon chitin-binding protein (PmCBP) is involved in white spot syndrome virus (WSSV) infection. Fish Shellfish Immunol 27(3), 460-5. 12. Chou, H. Y., Huang, C.Y., Wang, C.H., Chiang, H. C., and Lo, C. F. (1995) Pathogenicity of a baculovirus infection causing white spot syndrome in cultured penaeid shrimp in Taiwan. Dis Aquat Org 23:165-173. 13. Li, Z., Lin, Q., Chen, J., Wu, J. L., Lim, T. K., Loh, S. S., Tang, X., and Hew, C. L. (2007) Shotgun identification of structural proteome of shrimp white spot syndrome virus and iTRAQ differentiation of envelope and nucleocapsid subproteomes. Mol Cell Proteomics. 14. Liang, Y., Cheng, J. J., Yang, B., and Huang, J. The role of F1 ATP synthase beta subunit in WSSV infection in the shrimp, Litopenaeus vannamei. 15. Lo, C. F., Ho, C. H., Chen, C. H., Liu, K. F., Chiu, Y. L., Yeh, P. Y., Peng, S. E., Hsu, H. C., Liu, H. C., Chang, C. F., Su, M. S., Wang, C. H., and Kou, G. H. (1997) Detection and tissue tropism of white spot syndrome baculovirus (WSBV) in captured brooders of Penaeus monodon with a special emphasis on reproductive organs. Dis Aquat Org 30:53-72. 16. Lo, C. F., and Kou, G. H. (1998) Virus associated white spot syndrome of shrimp in Taiwan: a review. Fish Pathol 33:365-371. 17. Mayo, M. A. (2002). A summary of taxonomic changes recently approved by ICTV. Arch Virol 147, 1655 – 1656. 18. Mettenleiter TC (2004) Budding events in herpesvirus morphogenesis. Virus Res 106: 167 – 180. 19. Mettenleiter TC, Klupp BG, Granzow H (2006) Herpesvirus assembly: a tale of two membranes. Curr Opin Microbiol 9: 423 – 429. 20. Nakano, H., Koube, H., Umezawa, S., Momoyama, K., Hiraoka, M., Inouye, K., and Oseko, N. (1994) Mass mortalities of cultured kuruma shrimp, in Japan in 1993: epizootiological survey and infection trials. Fish Pathol 29:135-139. 21. Rajca ’ ni J (2003) Molecular mechanisms of virus spread and virion components as tools of virulence. A review. Acta Microbiol Immunol Hung 50: 407 – 431. 22. Sahul Hameed, A. S., Yoganadhan, K., Sathish, S., Rasheed, M., Murugan, V. & Jayaraman, K. (2001). White spot syndrome virus (WSSV) in two species of freshwater crabs (Paratelphusa hydrodomous and P. pulvinata). Aquaculture 201, 179 – 186. 23. Sritunyalucksana, K., Wannapapho, W., Lo, C. F., and Flegel, T. W. (2006). PmRab7 is a VP28-binding protein involved in white spot syndrome virus infection in shrimp. J Virol 80(21), 10734-42. 24. Tonganunt, M., Saelee, N., Chotigeat, W., and Phongdara, A. (2009).Identification of a receptor for activated protein kinase C1 (Pm-RACK1), a cellular gene product from black tiger shrimp (Penaeus monodon) interacts with a protein, VP9 from the white spot syndrome virus. Fish Shellfish Immunol 26(3), 509-14. 25. Tsai, J. M., Wang, H. C., Leu, J. H., Hsiao, H. H., Wang, A. H., Kou, G. H., and Lo, C. F. (2004) Genomic and proteomic analysis of thirty-nine structural proteins of shrimp white spot syndrome virus. J Virol 78:11360-11370. 26. Tsai, M. F., Lo, CF, van Hulten, M. C., Tzeng, H. F., Chou, C. M., Huang, C. J., Wang, C. H., Lin, J. Y., Vlak, J. M., and Kou, G. H. (2000a) Transcriptional analysis of the ribonucleotide reductase genes of shrimp white spot syndrome virus. Virology 277:92-99. 27. Tsai, M. F., Yu, H. T., Tzeng. H. F., Leu, J. H., Chou, C. M., Huang, C. J., Wang, C. H, Lin, J.Y., Kou, G. H., and Lo, C. F. (2000b) Identification and characterization of a shrimp white spot syndrome virus (WSSV) gene that encodes a novel chimeric polypeptide of cellular-type thymidine kinase and thymidylate kinase. Virology 277:100-110 28. Tsai J-M, Wang H-C, Leu J-H, Wang AH-J, Zhuang Y, et al. (2006) Identification of the nucleocapsid, tegument, and envelope proteins of the shrimp white spot syndrome virus virion. J Virol 80: 3021 – 3029. 29. Van Hulten, M. C., and Vlak, J. M. (2001) Identification and phylogeny of a protein kinase gene of white spot syndrome virus. Virus Genes 22:201-207. 30. Van Hulten, M. C., Witteveldt, J., Snippe, M., and Vlak, J. M.. (2001) White spot syndrome virus envelope protein

VP28 is involved in the systemic infection of shrimp. Virology. Jul 285:228-233. 31. Wang, C. H., Lo, C. F., Leu, J. H., Chou, C. M., Yeh, P. Y., Chou, H.Y., E. T. M., Chang, C. F., Su, M. S., and Kou, G. H. (1995) Purification and genomic analysis of baculovirus associated with white spot syndrome (WSBV) of Penaeus monodon. Dis Aquat Org 23:239-242. 32. Wang, Y.-C., Lo, C.-F., Chang, P.-S. & Kou, G.-H. (1998). Experimental infection of white spot baculovirus in some cultured and wild decapods in Taiwan. Aquaculture 164, 221 – 231. 33. Wongteerasupaya, C., Vickers, J. E., Sriurairatana, S., Nash, G. L., Akarajamorn, A., Boonsaeng, V., Panyim, S., Tassankajon, A., Withyanchumnarnkul, B., and Flegel, T. W. (1995) A non-occluded, systemic baculovirus that occurs in cells of ectodermal and mesodermal origin and causes high mortality in black tiger prawn Penaeus monodon. Dis Aquat Org 21:69-77. 34. Xie X, Yang F (2006) White spot syndrome virus VP24 interacts with VP28 and is involved in virus infection. J Gen Virol 87: 1903 – 1908. 35. Xie X, Xu L, Yang F (2006) Proteomic analysis of the major envelope and nucleocapsid proteins of white spot syndrome virus. J Virol 80: 10615 – 10623. 36. Yang, F., He, J., Lin, X., Li, Q., Pan, D., Zhang, X., and Xu, X. (2001) Complete genome sequence of the shrimp white spot bacilliform virus. J Virol 75:11811-11820. 37. Zhou Q, Xu L, Li H, Qi YP, Yang F. Four major envelope proteins of white spot syndrome virus bind to form a complex. J Viro