

Acción antibacteriana de péptidos derivados de IL-8

Flavobacterium psychrophilum

P. Santana^{1*}, L. Tamayo², F. Stambuk³, L. FAguilar³, M. Cortés⁴, F. Guzmán³, J. Forero⁵, M. Romero⁶, C. y A. Álvarez⁶

¹Universidad Autónoma de Chile, Santiago, Chile

²Universidad de Chile, Santiago, Chile

³Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile

⁴Universidad Mayor, Temuco, Chile

⁵Universidad de Valparaíso, Valparaíso, Chile

⁶Universidad Católica del Norte, Coquimbo, Chile

*paula.santana@uautonoma.cl

IntD+ti

- Álvarez, C., Acosta, F., Montero, D., Guzmán, F., Torres, E., Vega, B. & Mercado, L. 2016. Synthetic hepcidin from fish: Uptake and protection against *Vibrio anguillarum* in sea bass (*Dicentrarchus labrax*). *Fish & Shellfish Immunology*, 55: 662-670.
- Benfield, A. & Henriques, S. T. 2020. Mode-of-Action of Antimicrobial Peptides: Membrane Disruption vs. Intracellular Mechanisms. In *Frontiers in Medical Technology* (Vol. 2). Frontiers Media S.A.
- Björstad, Å., Fu, H., Karlsson, A., Dahlgren, C. & Bylund, J. 2005. Interleukin-8-Derived Peptide Has Antibacterial Activity Interleukin-8-Derived Peptide Has Antibacterial Activity. *Antimicrobial Agents and Chemotherapy*, 49: 3889-3895.
- Cabello, F., Godfrey, H. P., Ivanova, L., Shah, S. Q. A., Sørum, H. & Tomova, A. 2020. Freshwater salmon aquaculture in Chile and transferable antimicrobial resistance. *Environmental Microbiology*, 22: 559-563.
- Carvajal-Rondanelli, P., Aróstica, M., Álvarez, C., Ojeda, C., Albericio, F., Aguilar, L., Marshall, S. & Guzmán, F. 2018. Understanding the antimicrobial properties/activity of an 11-residue Lys homopeptide by alanine and proline scan. *Amino Acids*, 50: 557-568.
- Cepeda, C., García-Márquez, S. & Santos, Y. 2004. Improved growth of *Flavobacterium psychrophilum* using a new culture medium. *Aquaculture*, 238: 75-82.
- Chaturvedi, P., Bhat, R. & Pande, A. 2020. Antimicrobial peptides of fish: innocuous alternatives to antibiotics. *Reviews in Aquaculture*, 12: 85-106.
- Figueredo, J., Cárcamo, J., Yañez, A., Olavarria, V., Ruiz, P., Manríquez, R., Muñoz, C., Romero, A. & Avendaño-Herrera, R. 2019. Addressing viral and bacterial threats to salmon farming in Chile: historical contexts and perspectives for management and control. *Reviews in Aquaculture*, 11: 299-324.
- Flores-Kossack, C., Montero, R., Kölner, B. & Maisley, K. 2020. Chilean aquaculture and the new challenges: Pathogens, immune response, vaccination and fish diversification. *Fish and Shellfish Immunology*, 98: 52-67.
- Fu, Y., Ji, C., Chen, X., Cui, X., Wang, X., Feng, J., Li, Y., Qin, R. & Guo, X. 2017. Investigation into the antimicrobial action and mechanism of a novel endogenous peptide β-casein 197 from human milk. *AMB Express*, 7: 119.
- Hammer, M., Brauser, A., Olak, C., Brezesinski, G., Goldmann, T., Gutsmann, T. & Andrä, J. 2010. Lipopolysaccharide interaction is decisive for the activity of the antimicrobial peptide NK-2 against *Escherichia coli* and *Proteus mirabilis*. *Biochemical Journal*, 427: 477-488.
- Harris, F. M., Best, K. & Bell, J. 2002. Use of laurdan fluorescence intensity and polarization to distinguish between changes in membrane fluidity and phospholipid order. *Biochimica et Biophysica Acta - Biomembranes*, 1565: 123-128.
- Hartmann, M., Berditsch, M., Hawecker, J., Ardakani, M., Gerthsen, D. & Ulrich, A. S. 2010. Damage of the bacterial cell envelope by antimicrobial peptides gramicidin S and PGa as revealed by transmission and scanning electron microscopy. *Antimicrobial Agents and Chemotherapy*, 54: 3132-3142.
- Hoelscher, M. P., Forner, J., Calderone, S., Krämer, C., Taylor, Z., Loiacono, F. V., Agrawal, S., Karcher, D., Moratti, F., Kroop, X. & Bock, R. 2022. Expression strategies for the efficient synthesis of antimicrobial peptides in plastids. *Nature Communications*, 13: 1-17.
- Kato, G., Isaka, Y., Suzuki, K., Watanabe, S., Izumi, S., Nakayasu, C., Endo, M. & Sano, M. 2020. Immune responses induced by oil-adjuvanted inactivated vaccine against *Flavobacterium psychrophilum* in ayu *Plecoglossus altivelis*. *Fish and Shellfish Immunology*, 98: 585-594.
- Katzenback, B. A. 2015. Antimicrobial peptides as mediators of innate immunity in teleosts. *Biology*, 4: 607-639.
- Khuyen, T. D., S. N. M. Mandiki, V. Cornet, et al. 2017. Physiological and Immune Response of Juvenile Rainbow Trout to Dietary Bovine Lactoferrin. *Fish & Shellfish Immunology*, 71: 359-371.
- Li, L., Vorobyov, I. & W. Allen, T. 2013. The Different Interactions of Lysine and Arginine Side Chains with Lipid Membranes. *The Journal of Physical Chemistry B*, 117: 11906-11920.
- Li, S., Chai, J., Knupp, C., Nicolas, P., Wang, D., Cao, Y., Deng, F., Chen, F., Lu, T. & Loch, T. 2021. Phenotypic and Genetic Characterization of *Flavobacterium psychrophilum* Recovered from Diseased Salmonids in China. *Microbioloy spectrum*, 9: e00330-21.
- Malanovic, N., Marx, L., Blondelle, S. E., Pabst, G. & Semeraro, E. 2020. Experimental concepts for linking the biological activities of antimicrobial peptides to their molecular modes of action. *Biochimica et Biophysica Acta - Biomembranes*, 1862: 183275.
- Mansour, S., Pena, O. & Hancock, R. 2014. Host defense peptides: Front-line immunomodulators. *Trends in Immunology*, 35: 443-450.
- Mookherjee, N., Anderson, M. A., Haagsman, H. & Davidson, D. 2020. Antimicrobial host defence peptides: functions and clinical potential. *Nature Reviews Drug Discovery*, 19: 311-332.
- Murillo, L., Lan, C.-Y., Agabian, N. M., Larios, S. & Lomonte, B. 2007. Fungicidal activity of a phospholipase A 2-derived synthetic peptide variant against *Candida albicans*. *Rev Esp Químot*, 20: 330-333.
- Sáenz-Martínez, D., Santana, P. A., Aróstica, M., Forero, J., Guzmán, F. & Mercado, L. 2021. Immunodetection of rainbow trout IL-8 cleaved-peptide: Tissue bioavailability and potential antibacterial activity in a bacterial infection context. *Developmental & Comparative Immunology*, 124: 104182.
- Santana, P., Salinas, N., Álvarez, C., Mercado, L. & Guzmán, F. 2018. Alpha-helical domain from IL-8 of salmonids: Mechanism of action and identification of a novel antimicrobial function. *Biochemical and Biophysical Research Communications*, 498: 803-809.

- Sathyamoorthi, A., Bhatt, P., Ravichandran, G., Kumaresan, V., Arasu, M., Al-Dhabi, N. & Arockiaraj, J. 2017. Gene expression and in silico analysis of snakehead murrel interleukin 8 and antimicrobial activity of C-terminal derived peptide WS12. *Veterinary Immunology and Immunopathology*, 190: 1-9.
- Sernapesca. 2024. Informe con antecedentes sanitarios de agua dulce y mar. Subdirección de Acuicultura, Departamento de Salud Animal. Chile. [<https://www.sernapesca.cl/app/uploads/2024/09/Informe-Sanitario-ANO-2023.pdf>]
- Shah, S., Cabello, F., L'Abée-Lund, T., Tomova, A., Godfrey, H., Buschmann, A. & Sørum, H. 2014. Antimicrobial resistance and antimicrobial resistance genes in marine bacteria from salmon aquaculture and non-aquaculture sites. *Environmental Microbiology*, 16: 1310-1320.
- Soares, S., Walker, A., Elwenn, S. A., Bayliss, S., Garden, A., Stagg, H. & Munro, E. S. 2019. First isolation of *Flavobacterium psychrophilum* associated with reports of moribund wild European eel (*Anguilla anguilla*) in Scotland. *Journal of Fish Diseases*, 42: 1509-1521.
- Tai, H. M., You, M. F., Lin, C. H., Tsai, T. Y., Pan, C. Y., & Chen, J. Y. 2021. Scale-up production of and dietary supplementation with the recombinant antimicrobial peptide tilapia piscidin 4 to improve growth performance in *Gallus gallus domesticus*. *PLoS ONE*, 16: e0253661.
- Toyama, T., Kita-Tsukamoto, K., & Wakabayashi, H. 1994. Identification of *Cytophaga psychrophila* by PCR Targeted 16S Ribosomal RNA. *Fish Pathology*, 29: 271-275.
- Valero, Y., Saraiva-Fraga, M., Costas, B. & Guardiola, F. 2020. Antimicrobial peptides from fish: beyond the fight against pathogens. *Reviews in Aquaculture*, 12: 224-253.
- Wahl, T. & Madsen, L. 2018. Flavobacteria, a Never Ending Threat for Fish: a Review. In *Current Clinical Microbiology Reports*, 5: 26-37.
- Wenzel, M., Vischer, N., Strahl, H. & Hamoen, L. 2018. Assessing Membrane Fluidity and Visualizing Fluid Membrane Domains in Bacteria Using Fluorescent Membrane Dyes. *BIO-PROTOCOL*, 8(20).
- Wibowo, D. & Zhao, C. 2019. Recent achievements and perspectives for large-scale recombinant production of antimicrobial peptides. *Applied Microbiology and Biotechnology*, 103: 659-671.
- Yount, N., Waring, A., Gank, K., Welch, W., Kupferwasser, D. & Yeaman, M. 2007. Structural correlates of antimicrobial efficacy in IL-8 and related human kinocidins. *Biochimica et Biophysica Acta - Biomembranes*, 1768: 598-608.