



IN VITRO ACTIVITIES AND PROPERTIES OF SOME ANTIMICROBIAL PEPTIDES AGAINST MARINE *Vibrio* AND OTHER MICROORGANISMS

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Introduction

Infectious disease is considered to be the most devastating problem in Aquaculture. The development of alternative therapeutic agents, less ecologically harmful than usual antibiotics and that do not lead to bacteria resistance is an essential need to a sustainable Aquaculture. Naturally occurring antimicrobial peptides (AMPs) form a first line of host defence against pathogens and are largely distributed among living organisms. The study of AMPs is interesting not only for the progress of basic knowledge on innate immunity but also because of their many potential applications for disease management in aquaculture [1]. In the present study, we investigated the *in vitro* activities and properties of some AMPs produced by different aquatic animals: penaeidin (Pen) from the shrimp *Litopenaeus vannamei* [2], tachyplesin (Tach) from the horseshoe crab *Tachypleus tridentatus* [3], clavainin A (Clav) from the tunicate *Styela clava* [4] and magainin (Mag) from the frog *Xenopus laevis* [5], in order to evaluate their potential therapeutic use, especially for cultured marine animals.

Results

Antibacterial activity

Bacteria	Clavainin		Magainin		Tachyplesin		Penaeidin	
	MIC (µM)	MBC (µM)	MIC (µM)	MBC (µM)	MIC (µM)	MBC (µM)	MIC (µM)	MBC (µM)
<i>E. coli</i> ATCC	>50	>50	6.25	12.5	0.78	0.78	nd	nd
<i>E. coli</i> 383	>50	>50	6.25	6.25	0.78	0.78	12.5	12.5
<i>M. luteus</i>	12.5	12.5	0.39	0.39	0.20	0.20	6.25	6.25
<i>S. aureus</i> ATCC	>50	>50	>50	>50	3.12	6.25	nd	nd
<i>V. harveyi</i>	>50	>50	50	50	0.78	1.56	nd	nd
<i>V. alginolyticus</i>	>50	>50	12.5	12.5	0.78	0.78	>50	>50
<i>V. anguillarum</i>	>50	>50	12.5	12.5	0.78	1.56	>50	>50

E. coli ATCC 25992; *S. aureus* ATCC 25923
nd: not determined, since the activity was already tested in previous works

Antifungal activity

Peptide/Fungi	<i>Microsporium canis</i>	<i>Trichophyton mentagrophytes</i>
	MIC (µM)	
Tach	>50	6.25
Clav	>50	>50

Cytotoxic activity

The different AMPs had no cytotoxic effect against the tested eukariotic cells, up to 40 µM.

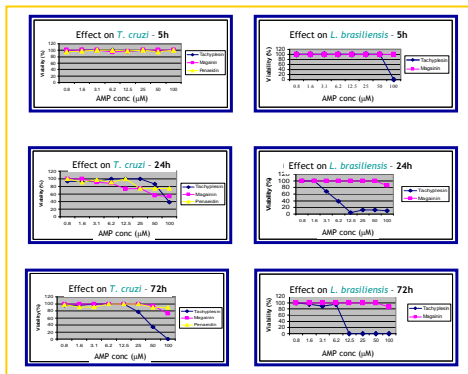
Antiviral activity

(% Cell protection against virus replication)

Peptide (37.5 µM)	HSV-1 (DNA enveloped virus)	Adenovirus-type 5 (DNA non-enveloped virus)	Rotavirus SA-11 (RNA non-enveloped virus)
Tach	nd*	nd*	55.95 ± 4.78
Mag	20.85 ± 12.71	13.2 ± 5.57	20.55 ± 9.88
Clav	nd*	9.92 ± 2.47	34.16 ± 2.03
Pen	CE ₅₀ =0.625 µM (SI = 64)	1.77 ± 0.11	0.98 ± 0.09

nd* = not determined, since the activity was already tested in previous works.

Antiprotozoan activity



Conclusions

- Tach was very stable under saline conditions and potent against marine bacteria, filamentous fungi and protozoan parasites.
- Mag had an activity against marine *Vibrio*, but to a lesser extent than Tach, especially against *V. harveyi*.
- All tested peptides exhibited an activity against *T. cruzi* and *L. brasiliensis*, but the most potent effect was caused by Tach.
- Tach had an activity against *T. mentagrophytes* and Clav was inactive against both tested filamentous fungi.
- All tested AMP had a tendency to decrease their activity at high salinity and to increase at low salinity.
- None of the AMPs had a cytotoxic effect, up to 40 µM.
- Pen had an evident antiviral effect against the enveloped virus, HSV-1.

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IMMUNAQUA European Project (Contract n° ICA4-CT-2001-10023)
Antimicrobial Immune Effectors in Marine Invertebrates: Characterisation and Application for Disease in Aquaculture.
The goal of Immunaqua is to provide new tools and environment friendly technology for a sustainable development of aquaculture. Project coordinator: Alexandre BACHÈRE (bachere@ifremer.fr) <http://www.ifremer.fr/immunaqua>