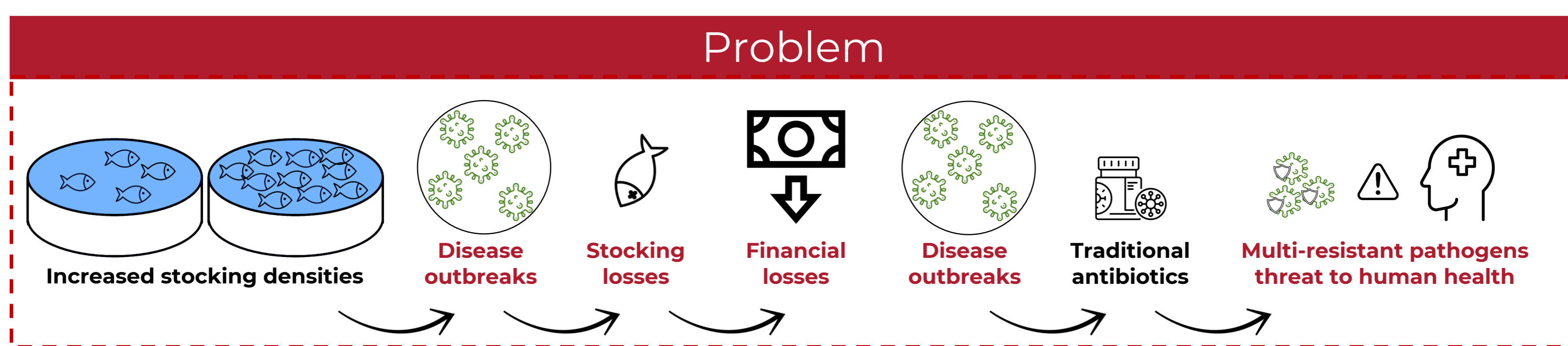


APPLICATIONS OF ANTIMICROBIAL PEPTIDES FROM AQUATIC INVERTEBRATES IN AQUACULTURE

T. Rodrigues, F.A. Guardiola, A. Antunes, D. Almeida*



* daniela.martins@um.es



AMPs: Antimicrobial peptides

1. Small molecules part of the innate immune system

- 8-150 amino acids
- molecular weight <30 kDa
- mostly cationic

2. Multi-target the pathogens (less risk of resistance)

- Mechanisms of cell membrane targeting
- Inhibition of cell wall synthesis
- Intracellular targeting
- Interference with protein synthesis
- Disruption of metabolic pathway
- Immune modulation

3. Several biological activities

4. Present across several taxa

(Number of AMP families described for each phylum)

AMPs in aquaculture

- Potential Solution**
- In **aquatic environments**, invertebrates are the main source of AMPs [1];
 - Over **50 aquatic invertebrate AMP families** shown *in vitro* antimicrobial effect against **key aquaculture pathogens**, including WSSV, *Vibrio* spp., and *Aeromonas* spp., in over 150 studies [2,3];
 - Promising ***in vivo*** research in **key aquaculture species** e.g., whiteleg shrimp and green mud crab [4,5];
 - Other AMPs (bacteriocins, histatins, gramicidin, polymyxins, daptomycin) already **clinically approved**;
 - Currently, **no AMP has been approved for application in aquaculture**.

Challenges & Strategies

- | | |
|--|---|
| <ul style="list-style-type: none"> • AMPs with low water solubility, salt and pH sensitive, potential hemolytic; • Production of AMPs in large amounts and cheap cost; • Reproduce <i>in vitro</i> results in living organisms. | <ul style="list-style-type: none"> • Chemical modification of AMPs / Design of synthetic AMPs [6,7]; • Gene cloning and optimization of expression conditions [8]; • Further <i>in vivo</i> studies in different scales. |
|--|---|

Innovations on the Horizon

- Exploratory review coming soon **Rodrigues et al., 2024**:
- 1. Description of the AMPs and families discovered from aquatic invertebrate species;
 - 2. Protein/peptide domains, FQ properties and structure prediction for those lacking the data;
 - 3. Antibacterial, antifungal and antiviral activities of the AMPs against aquaculture and/or human pathogens;
 - 4. Potential applications of aquatic invertebrates' AMPs in aquaculture.

References



Affiliations:



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