interferons (IFNα y IFNβ) through the IFN-α/β receptor which triggers signal transduction mediated by JAK-STAT. The induced cytokines produce a cell antiviral state producing the expression of proteins with antiviral activity such as 2',5' oligoadenilate synthetase, quinase R and the GTPases Mx (Goodbourn et al. (2000) Journal of General Virology 81: 2341- 2364). Recent evidences establish that fish have an IFN system similar to mammals (Robertsen (2006) Fish and Shellfish Immunology 20: 172-191; Robertsen (2008) Fish and Shellfish Immunology 25: 351-357). The interferons have been cloned in several fish species like zebrafish (*Danio rerio*), American catfish (*Ictalurus punctatus*) and Atlantic salmon (*Salmo salar*) (Altmann et al. (2003) Journal of Virology 77: 1992-2002; Lutfalla et al. (2003) BMC Genomics 4: 29; Robertsen et al. (2003) Journal of Interferon and Citokine Research 23: 601-612; Long et al. (2006) Fish and Shellfish Immunology 21: 42-59). Additionally, it has been identified several IFN regulatory factors, molecules of the JAK-STAT signaling pathway, Mx proteins and other genes stimulated by IFN in different fish species. It was reported antiviral activity mediated by Mx proteins in *Salmo salar* and *Paralichtys olivaceus* (reviewed by Robertsen (2006) Fish and Shellfish Immunology 20: 172-191).

Despite the fact that it has not been discovered IFN like genes in crustaceans yet, it has been observed a negative regulation of STAT molecules (these are molecules which are activated in the IFN response in vertebrates) in response of WSSV infection. The negative regulation of STAT during a viral infection antagonizes the type I IFN response in mammals (reviewed by Johnson et al. (2008) Vaccine 26: 4885-4992). In bivalves, the knowledge of antiviral response is even less. There are evidences of antiviral activity in the hemolymph of these organisms and it has been suggested the presence of an IFN like mechanism (Olicarda et al. (2005) Antiviral Research 66(2-3): 147-152; Defer et al., (2009) Aquaculture 293(1-2): 1-7).

In aquaculture, it is of great interest the development of new compounds or compositions that can be employed in the control of viral infections, due to the damages that they cause in this activity.

Summary

In a first aspect, there is provided a "Pituitary Adenylate Cyclase Activating Polypeptide" (PACAP) for use in the treatment of viral infections and infectious diseases caused by viruses in aquatic organisms.

In a second aspect, there is provided a composition for use in the treatment of viral diseases and infectious diseases caused by viruses in aquatic organisms comprising the "Pituitary Adenylate Cyclase Activating Polypeptide" (PACAP).

In a third aspect, there is provided a veterinary combination comprising the "Pituitary Adenylate Cyclase Activating Polypeptide" (PACAP) and an antiviral molecule, wherein the antiviral molecule is a chemical compound pharmaceutically accepted for the treatment of viral infections.

In a fourth aspect, there is provided the combination as defined above for use in the treatment of viral diseases and infectious diseases caused by viruses in aquatic organisms.

Description of the invention

The present invention provides a solution to the above described problem providing a new alternative to control viral infections in aquaculture, by the use of PACAP in

CLAIMS

USE OF PACAP FOR THE TREATMENT OF VIRAL INFECTIONS IN AQUATIC ORGANISMS

1. "Pituitary Adenylate Cyclase Activating Polypeptide" (PACAP) for use in the treatment of viral infections and infectious diseases caused by viruses in aquatic organisms.

2. PACAP for use according to claim 1, wherein the PACAP is natural, synthetic or recombinant.

3. PACAP for use according to claim 2, wherein the PACAP is a ~~natural~~ fish PACAP.

4. PACAP for use according to claims 1 to 3, wherein the PACAP is used in an aquatic organism selected from the group consisting of salmonids, penaeid shrimps and bivalves.

5. PACAP for use according to claim 1, wherein the PACAP is used in the therapeutic treatment of viral infections caused by viruses of the *Herpesviridae, Papovaviridae, Togaviridae, Retroviridae, Reoviridae, Birnaviridae* and *Picornaviridae* families.

6. A composition for use in the treatment of viral diseases and infectious diseases caused by viruses in aquatic organisms comprising the "Pituitary Adenylate Cyclase Activating Polypeptide" (PACAP).

7. The composition for use according to claim 6, wherein the PACAP is natural, synthetic or recombinant.

8. The composition for use according to claim 6, wherein the composition is suitable for use in oral administration, in injection or immersion baths.

9. The composition for use according to claims 7 or 8, wherein the PACAP is a ~~natural~~ fish PACAP.

10. Veterinary combination comprising the "Pituitary Adenylate Cyclase Activating Polypeptide" (PACAP) and an antiviral molecule, wherein the antiviral molecule is a chemical compound pharmaceutically accepted for the treatment of viral infections.

11. The combination of claim 10 wherein the PACAP is natural, synthetic or recombinant.

12. The combination of claim 10 wherein the antiviral molecule is VIROTOP, ribavirin, amantadine or 5-ethynyl-1-β-D-ribofuranosylimidazole-carboxamide (EICAR).