

A True “Candidate Ig Kappa Gene” in the Sea-Star: *Asterias rubens* (Echinoderma)

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ABSTRACT

The axial organ of the sea-star *Asterias rubens* is a primitive immune organ. The B-like cells, when stimulated by various antigens, produce antibody substances correlated with Ig Kappa gene. A candidate Ig kappa gene (IgK chain V-IV region S107B precursor) more convincing in term of genome was shown.

Keywords: Igkappa Precursor, Sea Star Axial Organ

1. INTRODUCTION

A large number of investigations performed in the last few years, in our Laboratory, have provided evidence that the sea star *Asterias rubens* (echinoderma) possesses a primitive immune system with cellular and humoral responses functionally similar to those of the immune system of vertebrates. Recently kappa genes were discovered in the sea-star *A. rubens* (Leclerc *et al.*, 2011) so that complement genes (Leclerc *et al.*, 2013). The genomes obtained today are more credible than those carried out 2 years ago: We have tried to look for a candidate kappa gene which presents most homologies with a kappa gene of mammal. We had discovered mainly in (Leclerc *et al.*, 2011) 3 candidate Igkappa genes showing 250 nucleotides each.

We now present a “candidate Igkappa gene” in immunized sea-stars.

It seemed more sensible to look for this approach to the immunized sea stars than in the non-immunized sea stars.

2. MATERIALS AND METHODS

Sea stars *Asterias rubens* were obtained from the Biology Institute (Gothenburg University). After

immunization the axial organs were removed; RNA was extracted, using Trizol(Invitrogen) according to manufacturer instructions. cDNA was normalized using double strand specific nuclease essentially as described by (Zhulidov *et al.*, 2004). cDNA was fragmented using DNA Fragmentase (New England Biolabs), according to the manufacturer’s instructions. After ligation of adapters for illumina’s GSII sequencing system, the cDNA was sequenced on the illumina GSII platform sequencing 1×100 bp from one side of the approximately 200 bp fragments. Sequences were assembled using Velvet (Zerbino and Birney, 2008).

3. RESULTS AND DISCUSSION

Delmotte *et al.* (1986), antibody factor was isolated and purified. Leclerc (2000), it was shown that it presented homologies with human kappa-like.

Leclerc *et al.* (2011), the sea-star genome (*Asterias rubens*) was analysed, three Igkappa genes were described. In 2013 a “candidate gene” was discovered. It is advisable to see now, the following result, which constitutes the **Fig. 1**.

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One transcript (Locus_48242_Transcript_1_1_Confidence_1.000_Length_415) could be annotated via BLASTX to mouse "Ig kappa chain V-IV region S107B precursor" (P01680.1) from the SWISSPROT database, with an e-value of 0.00009. On an aligned region of 108 amino acids, 53 positive and 26 identical amino acids were found.

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>Locus_48242_Transcript_1_1_Confidence_1.000_Length_415
CAGTCATTAAGGACATGATAATTCGGACCGGGTCTTTAATATTACAATGACTGCTGCT
ATGCGTGGC
AACATGGCGTCTCTATGGATGTTCTTCTTTGTCGTGGGGATAACTTTACAACGGAGTTTG
GCGATTACA
CGTTTCGCGAGCAACCGTCGGACACTAGCGCGTTGCAGGGGAGCACAGTGGTGCTTCA
CTGCTCCGTTGA
GCAGTACATAAACACCACGGCCATCGTTTGGTGGAGCCGTGACTCGGTTCATCAGCCACA
ACAAAGACCTG
AAACTGTCCAGTCTAACACCGACCAGCTCCAAAGGTACTCGATTCAGGCGACGCATC
TCGGGGGGAAT
TCAACCTTAGAATAGTGAACCTTACCGCCACAGACGCCGCCAGTTACCGCTGTCAGATG
TTTGGC
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Fig. 1. Assembled transcript corresponding to Ig kappa chain V-IV region S107B precursor We verified that the gene just described was present in non-immunized sea stars

4. CONCLUSION

These observations confirm that certain mammal structures are present in the immune system of the sea star. It is good to call back that, in mice, the gene: IgK chain V-IV region S107B modulates the "antigen binding expression".

It is advisable to note in this DNA sequence 2 immunoglobulin sites. This gene would play the role of primitive antibody.

The main acquisition of Echinoderms seems to be the cellular differentiation in two subpopulations of cells, ancestral to T and B lymphocytes and their interplay with phagocytes resulting in the synthesis of specific humoral primitive antibody (Leclerc *et al.*, 2011; Leclerc, 2000)

Although all efforts to find a primitive form of immunoglobulin in sea-urchin genome (Leclerc, 2012) have been unsuccessful, it is the first time, we present arguments indicating that vertebrate immunoglobulin Kappa gene is present in an invertebrate and Deuterostomes.

We envisage to isolate this gene which could be beneficial in the domain of Immunotherapy.

5. REFERENCES

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