

Short Communication

The IL2 ‘S’ problem, IL4 evidence in *Asterias rubens* sea star (Echinoderm)

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Abstract

IL2-like activity was described in sea star, in the past but first sea star genome studies did not confirm the presence of IL2 in *A. rubens*. A new genomic survey of Interleukins: IL2 and IL4 was done, in this invertebrate.

Introduction

Echinoderms occupy a critical and largely unexplored phylogenetic vantage point from which to infer both the early evolution of bilaterian immunity and the underpinnings of the invertebrate innate and adaptative immunity.

Here, we present a survey of the *Asterias rubens* sea star genome for genes associated with immunity. In a preliminary work (1) IL1 and IL1R were detected but not IL2, IL4. Our purpose was to research potential interleukins: IL2, IL4 immune receptors, regulators and effectors, particularly, including unprecedented expansions of innate pathogen recognition genes.

Materials and methods

Immunized and non-immunized *A. rubens* sea stars to HRP (Horse-radish peroxidase) were used. Their axial organs were removed. RNA was extracted using Trizol (Invitrogen) according to manufacturer instructions. The

Following steps were already described [1], the cDNA was sequenced on the illumina GSII platform sequencing 1. 100 bp from one side of the approximately 200bp fragments. Sequences were assembled using Velvet [2].

Results

Immunized sea star genome shows a first result in the Table 1.

The Table 1 is correlated to the Figure 1 which is following:

One contig (Contig12015|m.10216) could be annotated via BLASTX to *Homo sapiens* “cDNA, FLJ95535, highly similar to *Homo sapiens* transcription factor 8 (represses interleukin 2 expression) (TCF8), mRNA” from the TREMBL database, with an e-value of 3e-40.

Table 1. Sea star similarities to human tcf 8 (1), to IL4 induced 1 (2).

tr B2RB18 B2RB18_HUMAN cDNA, FLJ95535, highly similar to <i>Homo sapiens</i> transcription factor 8 (represses interleukin 2 expression) (TCF8), mRNA OS= <i>Homo sapiens</i> PE=2 SV=1
tr A2RRH1 A2RRH1_HUMAN Interleukin 4 induced 1 OS= <i>Homo sapiens</i> GN=IL4I1 PE=2 SV=1

On an aligned region of 96 amino acids, 79 positive and 71 identical amino acids were found.

Another contig allows us to report the IL4 obtained sequence in immunized sea stars to HRP (Figure 2).

One contig (Contig10756|m.9341) could be annotated via BLASTX to *Homo sapiens* “Interleukin 4 induced 1” from the TREMBL database, with an e-value of 2.28e-16. On an aligned region of 453 amino acids, 187 positive and 105 identical amino acids were found.

Discussion and conclusion

We have learnt that sea star T lymphocytes can release soluble lymphokin mediators, after stimulation with P.W.M (Pokeweed mitogen) sepharose 6 MB beads with mitogenic properties [3] IL2-like was discovered in Legac *et al.* [4], using flow cytometric discrimination, but first genomic studies [1] didn’t corroborate this cytometric result.

So, recently, we took back genomic works: We mainly found TCF8, which represses interleukin 2 expression in man, but what did it do in sea star? Is it an indirect evidence of IL2 in *Asterias rubens*? It remains enigmatic. We also found IL4 in immunized sea stars only. IL4 induced 1: an interleukin induced by B lymphocytes and why not by sea star B lymphocytes? [1].

The possible absence of true IL2 may reflect the difficulties of identifying these rapidly evolving genes, which have slow protein

5’GGAGGATTCAGTGGGTGAAGTCTCCCCAAACCGGACCGCAGGAGACGAGATCGTCTCTACGTACCTCTGCTGGACTCTACTCATGCACCCAGTGCCCCAAGACATCCAGAAGCACAGCTCCCTGCTCAGACACGTGTACGAGCACTCAGGTGAGCCAAAAGTAAGCGTCCACACGAGTGTAAGGAGTGCGGCAAGGCCCTTTAAGCACAAGCACCACTCATGGAGCACGCGCGTCTTCATAGTGGTGAGAAGCCATACCAAGTGTGACAAGTGCCTTAAGAAGTTCTCTCACTCCGGCTCCTACAGCCAGCACATGAACCATCGCTACAGCTACTGCCGTAAAGAGGACAATCTCAACAGGGGGATGAGCAAGGTGGTATGGATGAAGATGAGGAGATGATGGAAGATGGAGAAGTTGAAAGATGAAGCAGAGTGGG3’

Figure 1. tcf 8 sequence (5’-3’).

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Received: February 04, 2016; **Accepted:** March 01, 2016; **Published:** March 08, 2016

5'TCTGGTGTGGAGGCTCGAGATCGTCTCGGAGGTGCAACCCACACTCTGGTGGG
 CCCCTCCATTGGTTATGTGGATTTGGGCGGAGCTTACGTGGGCCCCACCCAGAAATC
 GTCTTCTCCGTATGGCCAAAGGAACTGGGCGTGGGAAAACACAAAGATCAACGAAGC
 TGAGAGGCTTGTGGGTTGATAATCAACGTGGTTACCTTTCAAGGGATCATGGC
 CCAAGTTCTGGAACCTCTCGTCAATCTGGATTTGAATAACGCTATCCGAGAGATC
 GACAGACTTGGAGATATGATTTAGTGGATGCACCTTGGGACGCACCAATGCCC
 AAGAGCTGGATAACATGACGATGAAAGAATGGATCGACAAAGACATGTTGGACAGA
 AAGCATCCGCCCTCTTTTATTACAACCTTGTGAGGTTGGCGTTTGCATGGAACCCC
 AAGAGCTATCGGTCCTCTTCTCGCGTGGTATCTGAAACAGACAGGTGGATACGTT
 CGATTTATATCGAGTGATAATGGCGGCCAGGAGCGGAAGTTTGTGGTGGATCTCA
 GCAGATAAGCATTAAGATGGGAGAGAAGATCGGCAAAAGAGAATCAAGATGGA
 GAGTCCAGTAGCTCAGATTAATCAGAGTGAGGAGTCTGTTCTGTGCACACCATC
 AACGGAGATGTCTATCAGGCTAAGTACGTGATCAGCGCAATGGCCCCACCTTTGAC
 CCAGAAGATTCACTATGACCCGCCCTCGCTCCTAGGAGAAACAGCTGATATCCA
 GAGCCCTGTAGGCAGTGTATCAAGTGCATGGTGTACTACGCAAGACATGGTG
 GAAAGATAGAGATTTTGTGGCTCCACCTTCAACGTTGACCCAGCAAGTCCGATG
 GTGTATTCACTTGTATGACACAAAACCTGATGGCAGTCAACCAAGCCCTTATCTGTT
 TGTGGCTGCTAACAAAGGCCAGAGAGTTCTGCGGGATCAGCAAAGAGGAAAGACG
 AGACAGGCTGTGCAGATGTTACAGTGTGCTTCCGTTGGAGCAGAGGAAGCCTTA
 CACCTATCAACTACAAGGAGAAGAACTGGATGAATGAGCAGTACTCCGGTGGCT
 GCTACACCTCTACCTATGGCCCTGTTGTTCTGACTCAACTTGGAAAAGAGCTCCGT
 AAACCAATTGGCAGATTGATTTTGTGGGACTGAACTGCGCACACACTGGGCTG
 GCTACATGGAAGGAGCTATACAGGCTGGAGAGAGAGCTGCTAGGAGATTACGCA
 CAGAATGGGAAAGATTGACGAGAATGAAATCTGGCAGGATGAACCAGAAATCAAA
 GGAGGTGCCAGCCCTTCCGATACCGACCACTTCTACGAACGCAACCGCTCCATC
 TGTAACCTGGCTTGTTTAAATTCATTGGTCTGACTGTTGCTGTCTGCTGTTATCGG
 AGTCTTCGCGATCTGCCGCTGAAGAAAAATAAACACATCGATCGACGAGCCG
 AGACAAACCAACTCCTGAAGATATTCCTGAGTGAGCCAAACTCCATTCAAGAAA
 AATTATTCATTTAATGCGATTCAATTGAGAGATTATTTCAAGATATTGCTTTGAGA
 AAGAAAAAAATACTGTCAATATAAAACAAATGTGGAGGCGGCTTCAAAACAAGCAGA
 GTTTGTCAAGAAACGTCCTACAAAAAACCCGAAACAAACCAAGTTTACAAA
 GGTAAAAAATAAACAAATAATTGATTATATGCTGACTTTAATCATGTGATGTG
 GTTGAATGCCGCGCAGAGTTACTATTTTATTTTATTAATTTGGTGTTTAGGGTTCTATT
 AGTTTTTGGTTAGTAGCATTGTTTCTTATAGGTAAGTGGCAACAATTTCAAATTA
 TACTGCGATCCAGTTTCCATAAAACAAAGTGTTCATGAACCTAACCCTAGGGCT
 CAGTTTCATGGAAGTCTTAAGCATAAAAGTTGCTAAGCACAGACAAATATGCT
 AACCCGATTACGTTACAGCTAAAATACAGCTATACATGACACAATGTAAATGG
 TATCCTGCTTAAATGTGCTTAGCGGGAAAATTTCTGCTTGCCACTTGTGTGATAACT
 AGTGATATATCAGAACTGTTATCTTGTATTGAATAGCTCGCCTGTACATGTAG
 GACCTTTTCTTTTCTTCTGCTGGACGTATGAAAGTCAATTAATCTTAAAAAAGG
 AAACCTGAAGTAATGGAAGAAAGTCAAGATTTGTGTGAAGTTGCAGTGGAAAGCT
 GTCAAAGTTTCTCTGAAGAAATGATTCTGTTTGAATAAGATGGTCACTTTGTGGG
 TGACTGTATGAGGCGCCATAAATATGCCTTTTAAATAATAATAAATAATTTTGT
 AGGTTTATTATTATACATTAGTTTGAATGGTGACTTTGAAGTACACACTGAA3'

x

0,52 Go (3 %) utilisés sur 15 Go
[Gérer](#)

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Figure 2. Sequence of IL4 induced 1.

domain complexity and complex intron-exon structure.

Nevertheless, members of most cytokine and chemokine families and their receptors were detected in the sea star genome.

In conclusion, our data are consistent with the hypothesis that a true cytokine network exists in *Asterias rubens* genome.

References

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