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Evidence of ITGB1 Gene in Invertebrates : The Echinodermata

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Abstract

Many genes which are present in Human are present also in Echinodermata such as ITGB1 gene. Its main characteristics and sequence are described in this paper.

Keywords: *Invertebrates, Echinodermata, Crinoïd, ITGB1 gene.*

Introduction

ITGB1 Gene (Integrin Subunit Beta 1) is A Protein Coding Gene

Integrins are heterodimeric proteins made up of alpha and beta subunits.

ITGB1 gene is a typical one we met usually in Human it provides instructions for making a receptor protein that spans the outer membrane of : « **Cells showing the « antigen ».**

Since we discovered Invertebrate Primitive Antibody(Ref.1-2) and invertebrrate lymphocytes in Echinodermata , we decide to look for genes and cells which are implicated in » **showing the antigen ».**

It is why we tried to discover ITGB1 gene in Echinodermata.

Ophuirid and Crinoïd genomes were studied.

Materials and Methods

Animals

Ophiocomina nigra (Ophuirid) Antedon bifida (Crinoïd) were obtained at the station « Of Biologie Marine of Roscoff » France.

Obtention of Ophuirid and Crinoïd MRNA

Digestive coeca were excised from their bodies and mRNA were obtained from Uptizol (Interchim) then quality controls were operated.

Sequencing

Sequencing was made on Illumina Next Seq 500 with paired-end : 2. 75 bp

Transcriptome was assembled from RNA-Seq fastq files using Trinity v2.1.1 (Ref.3) with default parameters. A BLAST database was created with the assembled transcripts using makeblastdb application from ncbi-blast+ (v2.2.31+). The sequences of transcripts of interest were then blasted against this database using blastn application from ncbi-blast+ (Ref.4) with parameter word_size

Results

The following Table summarizes the characteristics of the A.bifida ITGB1 Transcriptome.

QueryID	Query Name	SubjectID	Identity (%)	Length	Mismatch	Gapopen	Query cover (%)	E-value	Bitscore
NM_002211.4	ITGB1	TRINITY_DN15598_c1_g1_i1	88,57	35	4	0	1,00	7,00E-03	43,60

The transcriptome sequence in 5'-3' is added :

TRINITY_DN15598_c1_g1_i1 (ITGB1)

5'GAGTATGCTAAAGACAAATTGGGTTGTAA
AATAAATGTCAGTAAATATATTTAATTGCAT
AAAACTTTATTACTGGTGTAAAAACTAGAGT-
GGATAATAAAATGTACAAATTGGTCTGTT
TATATTATGGCATTAATGTTTCATACATAC-
TATATACAAATTATTATATTCTTCGTTTTT
AAAATGTTATTTTAGTTTGAAATTAAT-
GTTTCATTAAACAAAATCGTCATATGTAAAAGA
AGTTGATCGTTCCCCCTCCCCTGTAAATG-
GAAAAGTTTCATTGCAAAGCTGTTTGCATAG
AAAATCGTACCGTATAAGAAGATACCGACA-
CACAACACAAAACAATCAAACCTCATTTTG
TCCCTTTAACCCCCTCTCTCAGACCTTTCAAAAAA-
GAAAATTAACACTCTTTTTTTGCGT
GGCCATAATTGCAATTCTGATTATTCAATCG-
GTTTGACGAGATATCCAAGTCCTATGCTG
CTAAAAATGTCTTTATCTTATATCTCAAAT-
GTTTTGTATATTGTTCCGAATATAAGATAC
CACTATTTCCAATATTTCAAAATCTCCCAT-
TGAATTCGATTTTGTTTTATACATTTACAT
TTAAATTAAATGTACCATCAAGTTTGTCGAT-
TATTTCACATTCAGAAATCATATGATTAT
TTATCTGGTTTGTCCAGATTTCAATGCAAAAT-
CATTTGCCAAATCAGTTGCCATATTGTC
TCTCAAATGTTTTGTATAATTCCAAATTT-
GAAATACCAATTCCAAATCTCCTGTTGAATT
TGTTTTTGTCTTGTACAGTTCAAATTTAC-
CATCAAGTTTTTCCACTTCGAGAATAAACCA
GTTTCTTATAATTCACACGTCTCGTCATATC-
CATCCATTCCAAATCTTACATAGGTATTT
TTAACCGAGGAATGATCATTCAATCTGACT-
GATGGCGCTGTTCTGGTTGAACACCATGTT
ATAGTAAAACACACAATTGACAAAAACT-
TCAATACTATTAATGTACCAAAAAATATAAAG
CGAAAAGATACAGAATCGTATGCAAGACAT-
TCGTACAGGTGGGTTTTGTCAGGGGGTTGG
CTGAGCATACAAGTGGGTTGTAGAATTGCT-
GGGAAGTATAGAACGGCAGGCAAGATTCCC
AATACGTAGGTGACAAATATGACTAGACCAA-
CAGCCACAGACCTGTCGCTGTGGGAAACA
CATCTTAAAACTACTAAAGTGGCTGGAACGTTTT-
GAATACCAGTGAGTGTAGCTGCAAAG
AACAGAAGCAGGAGGATACTCCACATTG-
GGTCGCAGTTGGCACTGCATACACCAGCCACA
GCGCTACCATTATTGCCACGTGAAAATGAA-
CAGCTTTCAAAATTAGTGTAGTTTCCCTGG
GAACATCCAGCGTAGCATGGAGACGCGTA-
GACAACGCCATTTGAACCGCATACTGGGAAA
TATTTATCAGAACAACCATGGCATGTTGT-
CAAGTTTGCAGTCCCGTCTTTAAATGGAGAA
ATATTTATTCCGTCGCAGTGTGGTGAGAA-
GAAAGTCCAATATAGTCCCCAAGATAGCAGA
CCGAACACCAGAACTGAGCGACAGAGTTGCT-
TGAGCTGTGAAACCTGACCTCTGATAAGT
ACCAAGGCTGCAATTGTACCACCGATGAT-
CAAACCAAAAACTACAGATATTGCAATCTTT
ACATCGGCAACTCCTCCTTCAATGCTG-
TAGTCTCTCTCCAAAAATGGTGGCAGGAATTGG
TAAATACCGCACAAGATGGCGCCTTCAAAT-
GCGTACGCAGCACAACTGCTGAGTAGTGTA
GGGTTTTGAAATAAACGAAAAATTGTCTTT-
GGTCGAACTCTGCTTGCTGATGATAGGCTG
ACTTCCTCTGCTAGCTGTCGATACTTTCCA-
AATGTTTCATGTCGTTTACACATGCGCCGT
ACCTCTGGACACTCGCCATCGTCTGTAAC-
CGTGTCTATCTTCCGGAATGTCAAGATCACA
AGACCAAGAGCCAATACGATGAGACCCAATA-
CACAGAAACCTATCCACCAGCGATCCATT
ACTTTCGATCCCCAGACTAATGGTTCATG-
GGTGATGGATTGTATTTCTGAACGCATACTG
AAACTCATAAGTTCTCCCAAAACCAATC-
CGAACCCCTCTGCTGCATATATTGCCACTATG
TACATTGGAGTGTACTTAACTGGAAGAGT-
GTCACATATATAGGTTAAACCTAAGCTGATC
TGAGGAGCAGCACCGAATCCACACATGAT-
CAATCCAATTGATAACCAGCTTAAAGTCGGT
GTTTCAGGTCCGTGATCACCATTATTACT-
ATTATTAACTTCACTAGCATTGCATAGTTCG
ATCGCAAGAGATGGTGCTCCTAGTTTATC-
GATTTCATCTTTTGATATAAAGTATCCTAGC
GTTGATATCAATGCCCCTAAGCCAATGAA-
GATGGTACCAACTGAAATCCATCGAGTTCTG
TGACGTTTTCCGCCGTTGTAACTGACAAA-
CATGATTGCTGTTATGATGCCGAAGTGGAAG
GAAAGAGGAACTGTTGATGTATTCTCAAGAC-
CCACTTGTAGAAAATGTGTAACTAGCATT
ATTATTCCCTGTATATAGCCTCGACATGTA-
CAGGATGTTATTAGTATCAATAGTAAAAGA
CTCCATGCGATCAACGGTCTGTTGTGAGTCT-
TGGTACAGTCGACGTGTTTAGGGGTGGCA
TGTAATGACGACGATCGTGGCGGCGGATCG-
GGTACGTCGTCGTCAGGCTCTGATGGTGTA
GGCGGCGTAGTCTGCATTCCATTTTCAAC-
GATTGAATTTTTGTCAATTTGTTCCTCTTGT
TCTGGATCGCCATATTCAGCAGAAGTAAAAT-
CAAGTTTATAGTCGGCCATTGTATTAGTG
GTATATTTGTTCCTAATCACTGACGCTGCCTCCTTT-
GTC**3'**

Discussion Conclusion

The transcriptome sequence fits very well with the IGTB1 human gene from an identity point of view. ITGB1 gene is present in Echinodermata. It's the first time demonstration was shown in Invertebrates.

In human, ITGB1 members are membrane receptors involved in cell adhesion and recognition in a variety of processes including embryogenesis, hemostasis, tissue repair, immune response and metastatic diffusion of tumor cells.

It seems obvious ITGB1 is implicated in immune response in Echinodermata since we discover IPA (Ref 1-2). Nevertheless further studies are necessary to valid this assert.

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