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Evidence of Cxcr4 Gene, Pecam1 Gene, Icam1 Gene, from Cells Showing the Antigen, in Invertebrates

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ABSTRACT

Many genes which are present in Human are also present in Echinodermata such as CXCR4 gene, PECAM1 gene and ICAM1 gene:they are characteristics of genes showing the antigen.2 Echinodermata genomes were studied : Ophiocomina nigra (Ophuirids) one and Antedon bifida (Crinoïds) one.The transcriptome sequences in 5'-3' were described in this paper.

Keywords: *Invertebrates ; Echinodermata ; CXCR4 gene, PECAM1 gene;ICAM1 gene.*

INTRODUCTION

CXCR4 gene, PECAM1 gene and ICAM1 gene are a typical ones we met usually in Human. The CXCR4 gene provides instructions for making a receptor protein that spans the outer membrane of cells specifically white blood cell.The protein encoded by PECAM1 gene was found on platelets (Invertebrate platelets were recently discovered (Ref .1) and T lymphocytes which exist also in Invertebrates .As for ICAM1 gene, it encodes for a ICAM1 glycoprotein which is situated on monocytes (in human).

Since we discovered Invertebrate Primitive Antibody (Ref. 2-3) and invertebrrate lymphocytes in Echinodermata , we decide to look for genes and cells which are implicated in » **showing the antigen ».**

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.4) 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.5) with parameter word_size 7.

RESULTS

Various Echinodermata transcriptomes of Antedon bifida and Ophiocomina nigra are summarized :

CXCR4 transcriptome in Antedon bifida (Crinoïd , Echinodermata)

The corresponding sequence in 5'-3' shows :

>TRINITY_DN12629_c0_g2_i1 (CXCR4)

5'AAAATGAAAAATGATACAACTTTTATTTTT
TATATGATTCCTTCAGTAATGGTAGGTCTA

TATGAAAGTTGATTAGGTAATACATTCTTA
TATACTGTTCTTAATTGCAACCAGTAATAT

TTTAAGTACAGACTACTACTCCACATATTT
GTATATTGATACAGTATTCCAAAATTGGTG

TATTGCAGTGTACAGTACTTTGTATTAAGT
TGTATGGGACTTATTTTTTAGCATTATATT

ACTGTAATACTTGACATGTTCCACTAGTTT
GTCCCGGTCTTCTTCTGGGAGAAATGCACA

TTCAGCAGCACAAACTCTTAATCTTATCACA
TCTTCATCCGATATTCCAAAATATTTCAG

AGCAATATCCTCTTCTGTCATTAATGTGTT
CATAAAATGCAAACTGTCGTCAGTATTTAA

TGAAAAATTCAAACTATCTTTTGCAAATC
TTATAGCTGGATGTTTATTCCAATCTGGACT

AACACTACCAAGAATCATACTAGAGGTTG
GGCATACTTCCAAATGTACATTTGTCTTCTT

TACCAACTCATAAACTTTGTCATCATCAAGA
CAATGATAACCGTGACCTATACGTTGAGC

TTTAAACACCTCAATTGCTTCCTTTACATT
GGCTGCTGGTCCGGACTCCCCTGCATGTAT

TGCTCTCTTTATGTTTAGTTTAATGGCTTC
CTGAAATGCCTGGTGAAATTCATTTTGTAG

AGTTAGTGATTCGTCACCACCTATACCAATG
CCTACAACACCATCATTTCGATACTTGTC

ACATAATTCTACAACCTCCTGGCACCACT
CTGGCTTTCCTCTCATAAGACATATTATACT

CCTGGCTTGTACACCATACTTGTCTTGTCCT
TCTTTTAAACCTTCATTCACAAGTTGTAC

AACTTGATCTGCTGTCATATTTTCATTTGA
TAGAAGATGGGGGCAGTATGATGTTTCGAA

ATATGCAACCCCTTCCTTCAACTTATCTTC
ACACAGATCTCTTGCAATTTCCTTTATTGC

TTCACTATCACCTCTTAGAATAGGCATATA
GATTTCAAAACTCTTGATGAATTTTGTCAA

TGATCCACCACCCACTACATGTAGCTCTGA
AGTGAAGTCTTTAAAGTTCTTTCCAGGCAG

TGTATCTAACATGCCTCGTCGTTTTGCAATG
TTCCAAAGAGTTTCTGCCCGACAAGAACC

ATCAAGGTGGCAATGTAATTCAACCTAAAA
TAAAAACCAATTCAACACATCCATAACATT

AAAT3’

The sequence of PECAM1 Transcriptome in 5’-3’ in Ophiocomina genome is following :

5’ATATATCATATATGATATAGTACCTTT
GTTATATATCATAATACATATAAATGTGT
ATTA

TGTTATCTATAATTATATAATTTCATATAT
AAGATGTATAATATGTATCATATATTATAT

ATGTTATGTAATATATATAGTATATATAA
GATGACACAGGATAAATATTATATACTA
TGA

CATATAAAATATATGAGGTTATATGTTA
CATATAAGGCATAGCACATAACATGTAA
TATA

TATCATATATAATTTTTTTTTAGACAGAAT
CTTGTCCTGTTGCACAGGGTGGGGTACAAT

GGCGCCATCTTTGCTCACTGCAACTTCTGC
CTCACGGGTCCAAGCGATTGTCCTCCCTCA

GCCTCCCAGGTAGCTGGGACTACACCAC
ACTGGGACTACACCAGCTGCCACCATGC
CTAG

CTAATTTTTGTATTTTTGGTAGAGACAGG
GTTTTGCCGTGTTGCCCAGGCTGGTAGAT
CGG3’

The sequence of Ophiocomina nigra transcriptome, in 5’-3’ shows the following nucleotides:

>TRINITY_DN49978_c0_g1_i1 (ICAM1)

5’GATTGATAAGTCATATGATATAAAATT
TGATTTTTTTTTTTTTTCCTATTTTTTGTT
GTT

GAAAATTTATACTTGTCAGTATTTGGGGTT
TTCACTTGTGGAGACCAATAAAGTGTATCT

CCAGTTTTGTTTGGAAATCGTTCATTCAGT
GTGTGATAACGCGATTACAGTACTTGTGGT

GCAATCAATTATAATGTGGATCAAACTT
CTCAAATGTTTAATTGTGATGTGTGGCGT
GTGCTTCAAATAAGCACTGAAT3’

Conclusion

Genes from cells showing the antigen (such as CXCR4 gene, PECAM1 gene and ICAM1 gene) are present in Invertebrates.

CXCR4 gene is, in human, in relation with immunodeficiences and cancer. We suppose it is in correlation with immune defence in Echinodermata. PECAM1 gene plays a rôle in the platelet’physiology .We recall we discovered, the IPA (Invertebrate Primitive Antibody) and the platelets(Ref : 1- 2-3) in these same Echinodermata. Further studies are necessary to determine the exact rôle of ICAM1 gene, in these last ones. But we suppose it is in relation to Nuclear-Factor B we found also, in Invertebrates.

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