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A New Challenge: Présence of ICAM1 Gene in Echinodermata (Invertebrates)

Michel leclerc

University of Orleans ,Sandillon, France

Abstract

ICAM1 Gene we met usually in human, was discovered, for the first time, in invertebrates, in echinodermata. Its parameters, its sequence in 5'-3' was clearly demonstrated in ophiocomina nigra (ophuirids).it is in correlation to nuclear factor b we discovered also in echinodermata. The interaction nfkappab -icam1 gene in human is well-known.

Corresponding author: Michel Leclerc, University of Orleans 45100, 556 Rue Isabelle Romée, 45640 Sandillon, France. Tel: + 330902413802: E-Mail: mleclerc45@gmail.com

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Introduction

ICAM1 Gene is a typical one we met usually in humans. ICAM1 Gene, in these last ones, encodes ICAM1 (intracellular adhesion molecule 1) also known as cd54 (cluster of differenciation 54). A glycoprotein which is often situated on monocytes that is to say : cells showing the antigen. Since we discovered invertebrate primitive antibody and invertebrate lymphocytes in echinodermata, we decide to look for genes and cells which are implicated in » showing the antigen » (1,2). It is why we tried to discover in echinodermta ICAM1 Gene. Ophuirid and crinoïd genomes were studied.

Materials and Methods

The animals (ophiocomina nigra (ophuirid) antedon bifida (crinoïd) were purchased by the station « of biologie marine of roscoff » france as sea star asterias rubens. Second, obtention of ophuirid and crinoïd mrna : digestive coeca were excised from their bodies and mrna were obtained from uptizol (interchim). In a third time, quality controls were made 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 with default parameters [3]. A blast database was created with the assembled transcripts using make blast db 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+ with parameter word_size 7[4].

Results

The following table (table1) presents the characteristics of echinodermata icam1 transcriptome

The sequence in 5'-3' shows the following nucleotides : >trinity_dn49978_c0_g1_i1 (icam1)

5'gattgataagtcatatgatataaaatttgatttttttttttttcctatttttgttgtt
gaaaatttatacttgtcagtatttggggttttcacttgtggagaccaataaagtgtatct
ccagttttgtttggaaatcgttcattcagtgtgtgataacgcgattacagtacttgtggt
gcaatcaattataatgtggatcaaacttctcaaatgtttaattgtgatgtgtggcgtgtg
cttcaaataagcactgaat3'

Queryid	Query name	Subjectid	Identity (%)	Length	Mismatch	Gapopen	Query cover (%)	E-value	Bitscore
Nm_000201.3	Icam1	Trinity_dn49978_c0_g1_i1	100,00	24	0	0	1,00	1,00e-03	45,40

Table 1: Ophiocomina nigra icam1 transcriptome.

Discussion Conclusion

ICAM1 Gene exists in invertebrates, specially in echinodermata. It is demonstrated in ophiocomina nigra (ophuirids) but not in antedon bifida (crinoïds) because of the not significative e-value. In human icam1 gene is connected to the nuclear factor kappa b. Howard et al., in a paper say : « reperfusion injury is mediated, in part, by the upregulated expression of genes in microvascular endothelial cells that encode for inflammatory cytokines and adhesion molecules [5]. The redox-regulated transcription factor, nuclear factor kappa b (nf-κb), may play a major role in the induced expression of these genes… agents which inhibit nf-κb activation may be potential therapeutic agents in acute ischemic stroke.

About the transcription factors, lavrovsky (ref.6) declares in 2000 :« transcription factors that are directly influenced by ros (reactive oxygene species) and proinflammatory cytokines include nuclear factor kappa b (nf-κb), activator protein 1 (ap-1), specificity protein ((sp1) [6]. So nf-kappa b may play a major role in the induced expression of icam1 gene. we have also found cytokines and specially nf-kappa b gene in echinodermata [7].

It seems correct to envisage such connection in these last ones, but further studies are necessary to assert this work hypothesis. These studies will include controls and inhibitions of nf-kappa b in echinodermata:they were demonstrated in human genomics, in human physiology [8-15].

According b.rayet (1999) icam 1 gene and nf-kappa b gene improve the capacity to fight tumor growth : « because deregulated nf-κb activity in many different tumor cell types is still susceptible to inhibition by recombinant iκbα molecules, there is hope for the development of effective approaches to restrict tumor growth, based on the many inhibitors of rel/nf-κb activity moreover, the correlation between nf-κb activity and the resistance of cancer cells to chemotherapeutic agents and ionizing radiation offers the possibility to enhance the efficacy of anti-cancer therapies by antagonizing nf-κb activity »

At last, it is important to notice echinodermata, with the asterid as model of study, contains.

The mouse « nuclear factor nf-kappa-b p 100 subunit » and the mouse « nuclear factor nf-Kappa-b p 105 subunit » [7]. In conclusion, in many points, mammals and echinodermata are similar. (Présence of icam1 gene, nuclear factor nf-kappa-b genes.)

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