

Human Oncologic Markers in the Crinoid: Antedon Bifida (Echinodermata)

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ABSTRACT

Evidence of breast cancer 1 and 2 genes and Estrogen receptor 1 one were found in the genome of the crinoid : Antedon bifida(an ancestral Echinodermata) in a significant manner.

INTRODUCTION

Many investigations concerning the genome of Antedon bifida have been performed in our laboratory (Ref. 1, 2, 3). It seemed interesting to look for genes implicated in cancerology diagnosis which is a true problem of Human Society.

BRCA1, BRCA2, CASC8, CASC16, ESR1, CRP genes were mainly studied. They encode for cancer susceptibility proteins as breast, ovarian cancers.

MATERIALS AND METHODS

animals (Antedon bifida) were obtained from « the station marine » of Roscoff (France)

Obtention of crinoid mRNA

Digestive coeca were excised from the A. bifida body.

bifida mRNA was obtained from Uptizol (Interchim). Quality control 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

Evidence of BRCA1, BRCA2, ESR1 genes occur in Antedon bifida A table summarizes the obtained results

Query ID	Query Name	Subject ID	Identity (%)	Length	Mismatch	Gapopen	Query cover	E-value	Bitscore
NM_007298.3	BRCA1	TRINITY_DN19334_c8_g2_i1	85.30	279	36	3	8	4,00E-75	283
NM_000059.3	BRCA2	TRINITY_DN19334_c8_g1_i1	84.07	113	18	0	1	2,00E-22	110
NM_000125.3	ESR1	TRINITY_DN20534_c0_g1_i5	89.74	39	0	4	1	1,00E-03	47,3

we complete this table by giving the sequences of BRCA1, BRCA2 transcriptomes :

```
>TRINITY_DN19334_c8_g2_i1 (BRCA1)
5'TGTAATCCCAGCACTTTGGGAGGCCGA
GGCGGGCGGATCACGAGGTCAGGAGAT
CGAGAC
CATCCTGGCTAACACAGTGAAACCCCGT
CTCTACTAAAAATACAAAAAATTAGCCG
GGCG
TGGTGGCGGGCGCCTGTAGTCCCAGCTA
CTCGGGAGGCTGAGGCAGGAGAATGGC
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GTGAA
CCCGGGAGGCGGAGCTTGCAGTGAGCCG
AGATCGCGCCACTGCACTCCAGCCTGGG
CGAC
AGAGCGAGACTCTGTCTCAAAAAAAAAA
AAAAAAAAAAAAAAAA 3'
>TRINITY_DN19334_c8_g1_i1 (BRCA2)
5'GTGCCTTAGAAATGCTGCATTATCCGG
TGTATCACCTGAGGTCAGGAGTTCGAGA
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CCAGC
CTGGCCAACATGGTGAAACCCCGTCTCT
ATTAATAATACAAAAATTGGCCGGGCGC
GGTG
GCTCACGCCTGTAATCCCAGCACTTTGG
GAGGCTGAGGTGGGTGGATCACCTGAGG
TCAG
GAGTTCGAGACCAGCCTGGCCAACATGG
TGAAACCCCGTCTCTATTAATAATACAA
AAAT
TGGCCGGGCGCGGTGGCTCACGCCTGTA
ATCC 3'

At last, the sequence of ESR1 is shown

>TRINITY_DN20534_c0_g1_i5 (ESR1)

5'CGAAGTGTTGGTGATATATTGACATTAA
TTTAAATTATTCAGAAGACAATATTTCTG
TA
GGCAATGTTAGCACATCAAGCATCATCAA
AACGGAAGCTACAAACGGTGATGTAGCA
ACA
TATCAGCAGCATTCTAAAACACATCAGAC
ATCGCACCAGCAGCACAAAGCATAACAAC
CCA
AGACATCGAACTTTTAGTACGACAAGTC
GTCATGCCGATGAACCGGAATGGAAAGA
AGTG
AAAGATCATCCACATGTCACAAAATATG
TCTACCACTGCAGATTTTATCATCAGTATT
T
GGTGCATTCGCGCATGGTGAAATGACAT
TAGTAACGCCATAGGACCATTCGTGGCAT
TG
TGGGTCATTTACACAACCGGTGATGTCCA
ACAAGAGGAACCAGTTGCAATCTGGATT
CTA
GTTTATGGATCAGCTGGCGTAGCAGTCGG
ATTGTGGTACTTGGGAAAAGAGTTATTG
AG
ACAGTTGGCGAGGACTTAACACCATTAA
CGGTTTCAAGTGCGTTTACAATTGAACCT
GGT
TCAGCAACAACCGTTCTAGTTGCCTCCAA
CCTGGGAATACCAATAAGCACAAACGCATT
GT
AAAGTAGGATCAGTGGTTGCCGTCGGAT
GGGTGAGAACAAAACAGCAGTTGATTG
GAAG
TTGTTCTATGGCATAATTGCAGCCTGGATC
ATCACACTTCCTGCCACTGTTGGTCTTAG
T
GCTCTGTCGATGTTCCCTGCTTCAGAAAAC
TGTAGTGTGAACAGAGTTGGATTTTAATA
AT
GGTGGTATGATAACATAAGTCGTATCATAT
TATGTTTTACCAGGAATACATAGGAATATC

CGGTAATACAAGGTCATGTGTGGCACAA
GTGTGGCTGTATCATGTAAGGTTAAGAGA
TGA
GTATGGCCTATGATACTAGGCAATACATGT
GGAGTCCATGTGATGCTGTATTACCAAAT
A
TCCATGTGATACTGGGAAAATTTAGATAG
AACAGAGAATCGGGTGCCTGTTTTGAAA
ATT
CCAATCCATAAGAAAAACAAAAGCCAG
TAGCCTATGTTCCACACAATGCAGAATTC
AGC
AACTTTATTATTATGTATTACAGGAAGCTA
ATATGGAATTAATAAGAGGGGAGGTTATT
G
TATATACGATTGATTGGTATTCCTAGTGA
CTGAGGGTATAGATGCCCGGATATTGGCT
G
ATGTCTGTCTTTGATGGTTAATGCATCCCT
GGCCCATCAAAAATGATTGCAGATAATAA
A
AGTTAACAATGATCTGAACAGTATCGACT
GTAACCTGTGACGTCAGGATAAGAAAT
GGG
GAGGCAGTGAACAAGTAATTGGGAGAAT
TATCTGTAATTTATTTTATCACTTTCTGAT
G
TACTGTACAAGTGCATATTGCACAATCCA
AAATTTAAATTTAAAAAAAATCATCAT
AA
TATATTGTATATGCATTAACAATACTT
ATATAGATAATAGTAATTTTTTAAATTAC
ATTTTTTGTAATGCAATACTTGTCTCTGA
GAAGAATTATACTATTGTTGATCTAAAGTT
AGTTATACCTTCATAATAAATTTGATAACA
TTAAAACAATAAATAGAATGTATCTATATG
TGCTTCTTTATAATGGTAATTGAGTCAATA
TTTGAATTTAGCAAACCTCAACAGACTGC
A
CAAAGTGTGATGCTTGAGTACAAAATATC
TCGATGGTAAAAATCATGTGACAAGGTGT
TC
TTGTAAAATTAGTTAACATTTTCAAGTAAAA
TCCGAAAAAAAACAACATTTTACTG
GTC
CTCTTACGAGAGACTGATCTACTACCTTT
ATTCTATTATTACTTCTATTTAATTAATAC
TACTAAAACCTGTATAATCCATAATCACATT
AAACCCTTCTAGTTTTTTTTTTTCATTTTTA
CTTAAATGTATTAATTTTGTTTTTTTGGAA
GTAGAAATGTGACAACCATCAGCTCAAAT
C
CAACTTGTTAAACATGCATTATTATTGGAT
TCAATAAAAAAAGAAGAATATATTTAAAT
A
CACCGTATTTTACTTCAAGTTTGTGCCTTAC
ATAAGGTATTTTAAAATACCTTACTACTT

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AAAATATAATACCTTACAGTGGTACTACA
AATAAACCAAACCTTTGCTAAATCAAATT
AC
GAAAAGTAATCTATTAATTGATTCTCAGAA
TACTAAAATTAGTAAATCCTTTAATCCTAA
CCATATTTCCCTAAAACCACCAAGGAAAAA
TTACAAATGTGCCAAGGATTACTCAGATT
TA
ATAAAAAAATACAGTATATGTACAGTACA
AGTTAAATTTTAGTTTTAAAATGAAAATAA
TT
GATTGAACGGGTAAAAATCTTTTCAGTTG
TTACAAGTTTGTGCCATATGACCCTACTA
AC
CAATTGAATACAACCTGTGGAAGCTGATTA
TATAATTAACCAGCAAATTAATTTCTAAGA
A
ATCCCATAGTTCTTGTACCAATCTGTATATT
ACATTGTTGTCAGGCTTTGAAGATAGGTA
TCGCGGCATGGAAGGTCATCTGCAGGTC
GGAAATGTGCTTTCCAGACAGGTTCCACC
AACA
AACAATCGCATAGCTTGTATGTAATTCCTTG
TATCCAAGGTGAAGCGATGGTATATTCCT
GCAGGCAACACAATCAGGTCGTTCTTCT
CCACGGCAATTCTCACCCAACGTTTCATCC
CGA
TCTCTAAAATCAAAGTAACCACTTCCATC
CAGAACAAACCGAATCTCCTCATCCGTAT
GA
AGATGTTCCCTCGAAAAAAGATTTTATTTT
TTCTTCATAATTGGGAAGTTTCTCTGGAG
AA
ACAGTTATACAATCTTCATAGGAATATCCT
CTTTCTTTGCGTATTTTGTCAAGCAACCC
T
TCTTTTTTGTAATTTTCTGCATCTACCAGC

CAATATTTTATACCATGTGAATCCAAATAG
TCTAAATCCAACATTTGCACAGGCTCTAG
ATGGTGTCAAGGCGTTGATCTTTTTCTTT
A
TCATTATCCATAAACCAGGCTTTTCACCAT
GTTGACGACTTTTAGTAGACCTATTAGGC
CC
AAAGTATCTTTGATTCAGTCGGAGAGCCG
CGTTGGGAAATATGAC3

CONCLUSION AND DISCUSSION

In humans, BRCA1 and BRCA2 genes can be considered as oncologic markers.

It is said that mutations of these genes are more common in certain ethnic populations than others ; they increase a woman's risk of breast and ovarian cancer.

As for ESR1 gene, it encodes an estrogen receptor, a ligand activated transcription factor, composed of several domains important for hormone binding.

To find such genes in an invertebrate remains enigmatic but seems interesting from a point of view of the phylogeny of proteins and genomics.

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