

# DNA Repair in Sea Star *Asterias Rubens*: Genomic Aspects

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## Abstract

In the present paper, we study the DNA repair through the animal kingdom and especially in the sea star system. Rad 51 family, found in *Drosophila* was shown in sea star genome, so that genes which are usually described in vertebrates.

**Keywords:** DNA repair genes; Sea star; Invertebrates

## Introduction

Both genetic and biochemical approaches have been used, to study the molecular mechanisms, by which damaged DNA is repaired, in a number of species. The fundamental DNA repair pathways have been functionally conserved for the most part among, prokaryotes, lower eukaryotes and higher eukaryotes. The proteins and protein families, involved, in these repair processes, show high degrees of amino-acid sequence conservation. However, there are also a number of cases in which lack of conservation of particular polypeptides may reveal interesting species specific differences in how certain repair functions are performed.

## DNA Methylation

In mammals, DNA methylation is associated with the regulation of gene expression and the maintenance of the differential state in cell lineages [1]. It is also present in other phylogenetic groups such as some invertebrates: sponges, some insects, sea urchins.

## DNA repair in Invertebrates

The recent completion of the *Drosophila* genome sequence show the existence of the Rad 51 Family DNA repair.

(Rad 51 named for *Saccharomyces cerevisiae*: the first member discovered). Two *Drosophila* Rad 51 have been

described [2] there are important in both recombinational DNA repair and meiotic recombination.

## Materials and Methods

Sea stars were obtained from Gothenburg University (Sweden) Sea star *Asterias rubens* genome has recently been studied [3] in immunized and non-immunized sea stars to HRP (Horse-radish peroxidase).

## Results

We find Rad 51 Family DNA repair and also what is original and not yet described, genes which are found in vertebrates exclusively:

In non-immunized sea star genome ("control")

**Control:** TR38504|c0\_g1\_i1 sp|Q64267|XPA\_MOUSE DNA repair protein complementing XP-cells homolog OS=Mus; musculus; GN=Xpa; PE=1 SV=2.

**Control:** Contig11913 sp|P23475|XRCC6\_MOUSE X-ray repair cross-complementing protein 6 OS=Mus musculus; GN=Xrcc6; PE=1 SV=5.

**Control:** Contig7953 sp|P27641|XRCC5\_MOUSE X-ray repair cross-complementing protein 5 OS=Mus musculus; GN=Xrcc5; PE=2 SV=4.

We find similar results in immunized sea star genome.

### Interpretation-Discussion

These genes, in mouse, are mainly used in cellular response to X-Ray, to gamma radiation, in Vertebrates. It is surprising to find them in an ancestral invertebrate: the sea star *Asterias rubens*: The sea star remains an enigmatic animal. Another explication can be performed: These genes named, in mouse: *Xrcc6* and *Xrcc5* play a role in the immune process in which immune receptor V, D and J, or V and J gene segments, depending on the specific receptor are recombined within a single locus utilizing the conserved heptamer and nonamer recombination signal sequence (RSS) regional genes (V,D,J) used to generate Immunoglobulin molecules. This last aspect of sea star genomic studies corroborates the existence of the sea star primitive antibody.

### References

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