



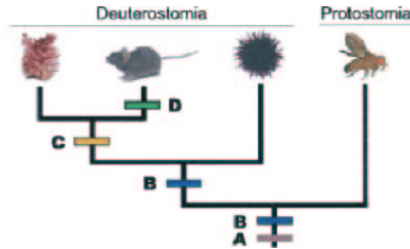
Faculty of  
Science and  
Technology  
Tokushima University

# Molecular Developmental and Evolutional Biology

Professor Kazuhiro, Makabe

## Neural Expression of the Huntington's Disease Gene as a Chordate Evolutionary Novelty

- D. Variation in the polyQ tract
- C. Addition of adult expression in neur-ectoderm and other tissues
- B. Adult mesodermal expression
- A. Early embryonic expression



Proposal for the evolution of Huntingtin (Hd) expression in the Metazoa.

- A. Early embryonic expression of Hd has been observed in fruit flies, sea urchins, ascidians, and zebrafish.
- B. The adult expression pattern of Hd.
- C. Expression of Hd found in both ectoderm and meso-ectodermal tissues in vertebrates.
- D. Polymorphisms in the polyQ repeat lengths are seen in primates and swine, but not in other vertebrates. Danio and Fugu HD contain only 4 Qs, and in *Drosophila* the CAG repeat is not present, indicating that the polyQ expansion of HD is a tetrapod, possibly mammal, specific character.

Collaboration with Professor R. Raff at Indiana University, USA.

### Content:

Huntington's disease is a progressive neuro-degenerative disorder in humans, which is characterized by onset of dementia, muscular ataxia, and death. Huntington's disease is caused by the expansion of the polyglutamine (polyQ) tract in the N-terminus of the HD protein (Huntingtin). The evolutionary origins of the vertebrate Hd gene are not well understood. We have cloned and characterized the expression of the Hd gene in two invertebrate deuterostomes, and have examined the expression patterns in a phylogenetic context. Echinoderms are basal deuterostomes and ascidians are basal chordates; both are useful for understanding the origins of and evolutionary trends in genes important in vertebrates. Expression of Hd RNA is detected at all stages of development in both the echinoderm and ascidian studied. In the echinoderm, Hd is expressed in coelomic mesodermal tissue derivatives, but not in the central nervous system. In the ascidian, expression is located in both mesoderm and nervous tissue. We suggest that the primitive deuterostome expression pattern is not neural. Thus, neural expression of the Hd gene in deuterostomes may be a novel feature of the chordate lineage, and the original role(s) of HD in deuterostomes may have been non-neural.

Keywords: marine and freshwater invertebrates, gene expression

E-mail: [kwmakabe@tokushima-u.ac.jp](mailto:kwmakabe@tokushima-u.ac.jp)

Phone: +81-88-656-7269

Fax : +81-88-656-7269

Web : <http://pub2.db.tokushima-u.ac.jp/>

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