

ES細胞の未分化/分化のスイッチ機構の解析

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2006 Fiscal Year Final Research Report Summary

Analysis of switching mechanism between self-renewal and differentiation in ES cells

Research Project

Project/Area Number

17570174

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

Developmental biology

Research Institution

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stem cells / self-renewal / cell differentiation / embryonic stem cells / signal transduction

Research Abstract

In this study, we tried to clarify the molecular mechanism of switching from undifferentiated ES cells to differentiated ES cells, which is regulated by leukemia inhibitory factor (LIF) in mouse ES cells.

At first, using DNA microarray method, we searched for molecules whose expression is restricted to either self-renewing ES cells or differentiating ES cells, and found several interesting genes, such as transcription factors (Zfp 57 and GABPa), a polycomb family protein (Eed), an oncoprotein (β -catenin) and a novel gene (STAT3-

activated gene 3, S3A3).

We next examined the role of these molecules in ES cells. Zfp57, though it is a good marker for self-renewing ES cells, was turned out to be dispensable for ES cell self-renewal. Eed was required for the maintenance of the "complete" undifferentiated state. Although S3A3 is dispensable for ES cell self-renewal, knockout of this gene promoted differentiation of ES cells into endoderm, suggesting that S3A3 is a negative regulator of endoderm differentiation. We thus renamed this gene as STAT3 downstream gene and differentiation regulator (Sddr). We also found that GABPa controls Oct-3/4 expression through suppression of Oct-3/4 repressors, and that LIF stimulates the stabilization of nuclear β -catenin, which in turn binds with Oct-3/4 to induce the expression of Nanog. These results suggest that LIF regulates the switching from self-renewing ES cells to differentiated ES cells through control of a variety of molecules, including Eed, Sddr, GABPa and β -catenin.

Research Products (8 results)

All 2007 2005

All Journal Article

[Journal Article] GABPa regulates Oct-3/4 expression in mouse embryonic stem cells

2007 ▾

[Journal Article] β -catenin up-regulates Nanog expression through interaction with Oct-3/4 in embryonic stem cells

2007 ▾

[Journal Article] GABPa regulates Oct-3/4 expression in mouse embryonic stem cells.

2007 ▾

[Journal Article] p-Catenin up-regulates Nanog expression through interaction with Oct-3/4 in embryonic stem cells.

2007 ▾

[Journal Article] Identification of Zfp-57 as a downstream molecule of STAT3 and Oct-3/4 in embryonic stem cells

2005 ▾

[Journal Article] Functional analysis of the effect of forced activation of STAT3 on M1 mouse leukemia cells

2005 ▾

[Journal Article] Identificatioi of Zfp-57 as a downstream molecule of STAT3 and Oct-3/4 in embryonic stem cells.

2005 ▾

[Journal Article] Functional analysis of the effect o forced activation of STAT3 on M1 mouse leukemia cells.

2005 ▾

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