Spatial and Temporal Expression of Immunoglobulin Superfamily Member 1 (IGSF1) in the Rat


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Introduction

X-linked IGSF1 deficiency syndrome
- Central hypothyroidism (CeH)
- Delayed puberty (but normal testis growth)
- Macroorchidism (adults)
- Variable PRL/GH-def and ↑BMI/fat%

IGSF1
- Plasma membrane glycoprotein
- Known mutations impair protein trafficking to cell membrane
- Function and expression profile unknown

Aim
To investigate spatial + temporal expression of IGSF1 in rat hypothalamus, pituitary gland, and testis, at the protein and mRNA levels.

Discussion
- The central hypothyroidism might be dysfunction of the thyrotropic cells of the pituitary, rather than TRH production by the hypothalamus.
- The delayed puberty and macroorchidism are likely caused by a local defect in the testis, rather than gonadotropin deficiency.

Results

<table>
<thead>
<tr>
<th>Pituitary gland</th>
<th>Testis</th>
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<tbody>
<tr>
<td><strong>IGSF1 present in Sertoli cells</strong> (stage II-III)</td>
<td><strong>IGSF1 not present in Sertoli cells</strong> (stage X)</td>
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Hypothalamus

IGsf1 is abundantly present in hypothalamus, but no co-expression with neuroendocrine cells was observed

TRH
GHRH
Somatostatin
Thyrosine hydroxyl.
GnRH
CRH

In situ hybridisation for Igsf1 (red probe) and neuroendocrine cells (green probe)

In all cases, specificity of IGSF1 protein expression was corroborated by in situ hybridization and real-time PCR for the Igsf1 mRNA.

Conclusion

IGSF1 expression observed in
- Hypothalamus; outside neuroendocrine cells
- Pituitary; specifically GH-, TSH-, and PRL-producing cells
- Testis; both in Sertoli cells (during specific stages of seminiferous epithelium) and Leydig cells.

Joustra et al., JCEM 2013; 98(12):4942-4952