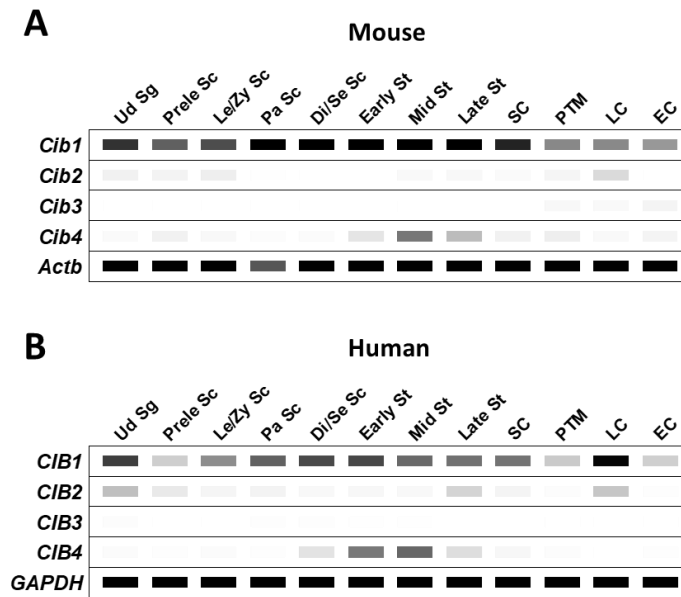


## Supplementary Figure S1



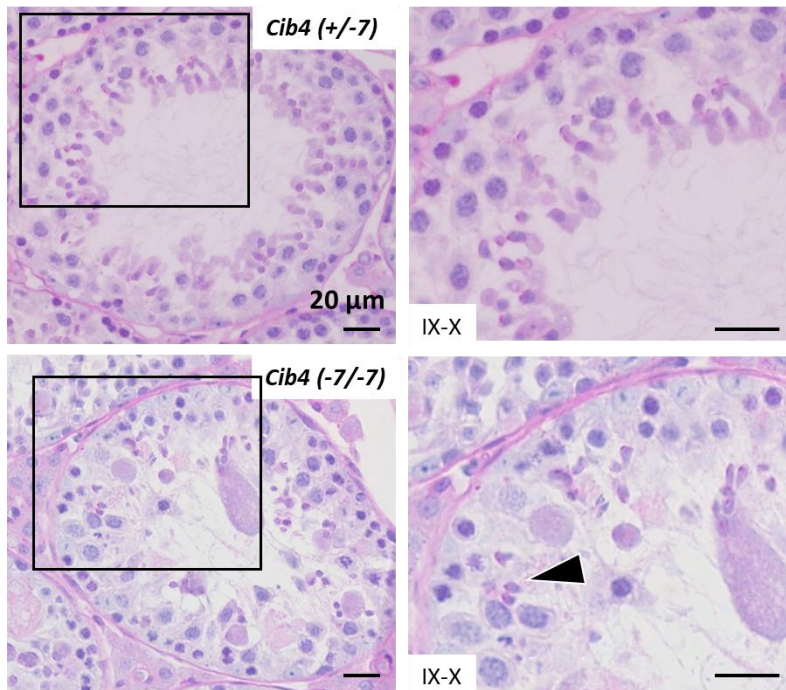
### Supplementary Figure S1. Single-cell RNA-sequencing database depicting the expression of CIB family during mouse and human spermatogenesis.

**A.** Median-normalized levels of mRNA expression of the *Cib* family members during spermatogenesis in mice. *Actb* was used as an expression control. The level of mRNA expression in each cell type is indicated by the intensity of each band. White: median-normalized reads = 0; Black: median-normalized reads  $\geq 4$ ; Gray:  $0 < \text{median-normalized reads} < 4$ .

**B.** Median-normalized levels of mRNA expression of CIB family members during spermatogenesis in human. *GAPDH* was used as an expression control. The level of mRNA expression in each cell type is indicated by the intensity of each band. White: median-normalized reads = 0; Black: median-normalized reads  $\geq 6$ ; Gray:  $0 < \text{median-normalized reads} < 6$ .

Ud Sg, undifferentiated spermatogonia; Prele Sc, preleptotene spermatocytes; Le/Zy Sc, leptotene/zygotene spermatocytes; Pa Sc, pachytene spermatocytes; Di/Se Sc, diplotene/secondary spermatocytes; Early St, early round spermatids; Mid St, mid round spermatids; Late St, late round spermatids; SC, Sertoli cells; PTM, peritubular myoid cells; LC, Leydig cells; EC, endothelial cells.

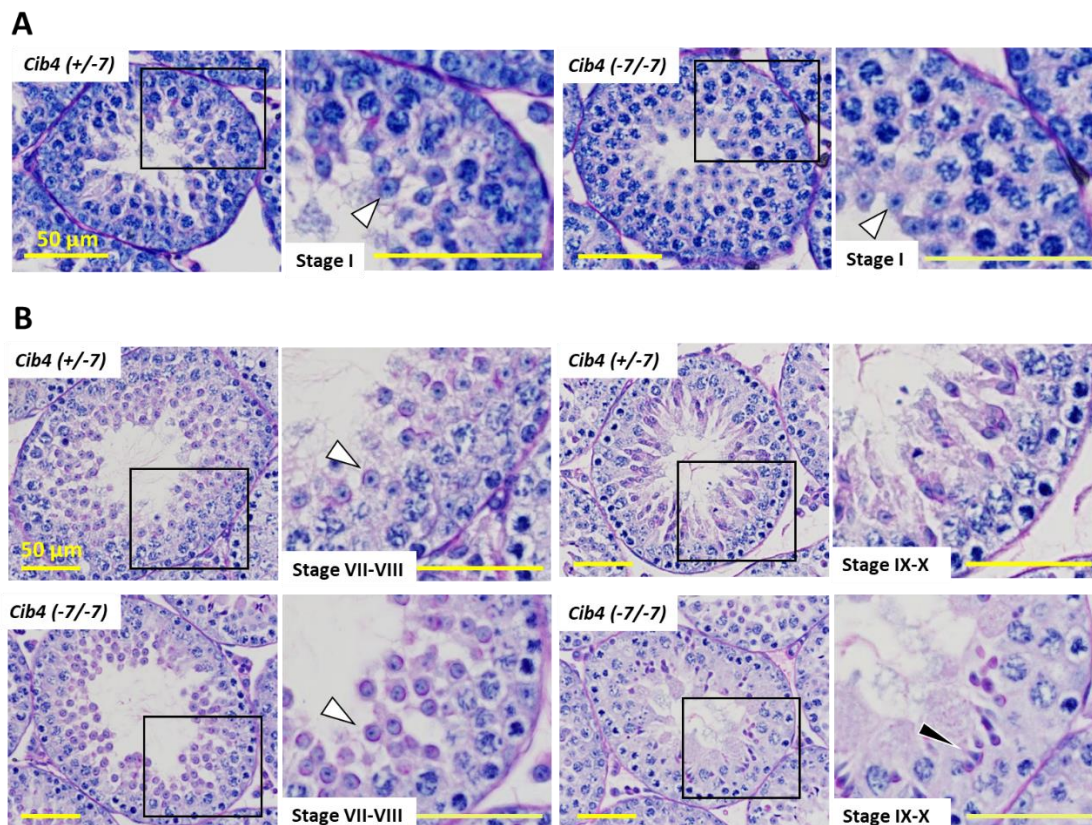
## Supplementary Figure S2



### Supplementary Figure S2. PAS staining of stage IX-X seminiferous tubules.

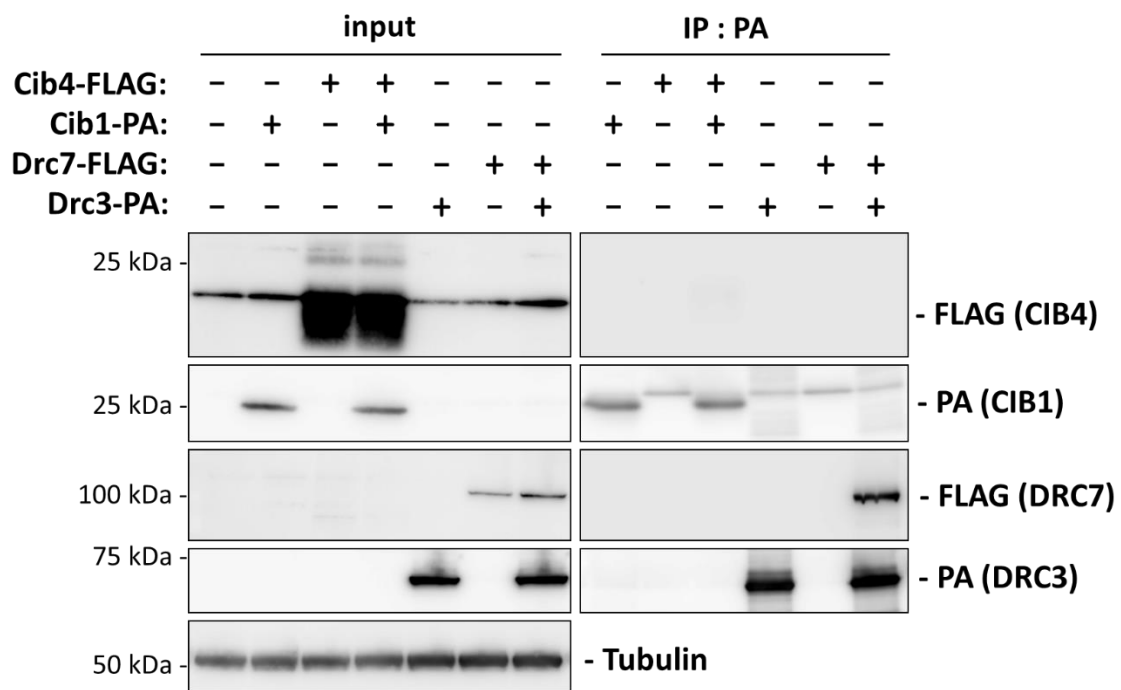
In stage IX-X seminiferous tubules, there are fewer elongating spermatids (black arrow) in *Cib4*<sup>-7/-7</sup> testis. Black rectangles indicate magnified regions.

### Supplementary Figure S3



**Supplementary Figure S3. First wave of spermatogenesis at postnatal day 21 and day 28.** A. PAS staining of testes cross-sections at postnatal day 21 showed normal round spermatids (white arrowheads) in stage I seminiferous tubules of *Cib4*<sup>+/-7</sup> and *Cib4*<sup>-7/-7</sup> mice. B. PAS staining of testes cross-sections at postnatal day 28 showed normal round spermatids (white arrowheads) in stage VII-VIII seminiferous tubules of *Cib4*<sup>+/-7</sup> and *Cib4*<sup>-7/-7</sup> mice. In contrast, abnormally transformed spermatids (black arrowhead) were found in stage IX-X seminiferous tubules of *Cib4*<sup>-7/-7</sup> mice. Black rectangles indicate magnified regions.

### Supplementary Figure S4



### Supplementary Figure S4. Analysis of CIB1-CIB4 interaction.

Interaction of CIB1-PA and CIB4-FLAG was not detected. Interaction of DRC3-PA and DRC7-FLAG was confirmed as a positive control.  $\alpha$ -Tubulin was used as a loading control.

**Supplementary Table S1. Sequences of primers**

<b>Gene</b>	<b>Method</b>	<b>Species</b>	<b>Forward Primer</b>	<b>Reverse Primer</b>
<i>Cib1</i>	RT	Mouse	ATGGGAGGTTCGGGCAGTCG	CAGGACAATCTTAAAGGAGC
<i>Cib2</i>	RT	Mouse	GACCATCTTCACTGAAGAGC	GATTCGAATGTGGAAGGTGC
<i>Cib3</i>	RT	Mouse	AGGCTGTTCTATCGATACC	GATGCGGATGTGGAAGGTGC
<i>Cib4</i>	RT	Mouse	AAGGTACCAGATGCAGTGGG	GCAGCCCCAGAAGTGAATCC
<i>Actb</i>	RT	Mouse	CATCCGTAAAGACCTCTATGCCAAC	ATGGAGCCACCGATCCACA
<i>Cib4</i>	Genotyping	Mouse	TGGAGGTGAGGGTTCTTAGC	GTTCTGTCCTGGATCTGTGACC
<i>CIB1</i>	RT	Human	CAGATTCTCAGCCTTCCAGAG	CAAAGTCAAAGATGCGGAAGG
<i>CIB2</i>	RT	Human	TCGAGGACATGATTGCCAAG	GTGTAAACCCAGAGGCTG
<i>CIB3</i>	RT	Human	GCGACCTCAAGGCTTACTATG	CAGCACCTTCTCACATAACCAG
<i>CIB4</i>	RT	Human	AGCCTGAAGATTGAGTATGCC	AACTCTGAGAAGGACAGCATG
<i>GAPDH</i>	RT	Human	AATCCCATCACCATCTTCCAG	ATGACCCTTTTGGCTCCC
<i>Cib1</i>	Cloning	Mouse	AAGGATCCGCCGCCATGGGAGGT TCGGGCAGTCG	AAGTCGACCAGGACAATCTTAA AGGAGC
<i>Cib4</i>	Cloning	Mouse	AAGGATCCGCCGCCATGGGGCA GTGTTTAAGG	AAGAATTCGAGCCCCAGAAGT GAATCC