

# piRNA pathway is essential for generating functional oocytes in golden hamster

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**Manuscript Source:** <https://www.biorxiv.org/content/10.1101/2021.03.21.434510v1>

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### Research Paper Sections:

The sections of the research paper input text parsed in this audit.

[illegible]

**Title**      **piRNA pathway is essential for generating functional oocytes in golden hamster**

**S1 [001]      Abstract**

**S1 [002]**      Piwi-interacting RNAs (piRNAs) are small RNAs predominantly expressed in germ cells that are critical for gametogenesis in various species.

Piwi-interacting RNAs ...  
... (piRNAs) ...  
... are small RNAs predominantly expressed ...  
... in germ cells ...  
... that are critical ...  
... for gametogenesis ...  
... in various species.

**S1 [003]**      However, PIWI-deficient female mice are fertile and mouse oocytes express a panel of small RNAs that do not appear widely representative of mammals, and piRNA function in the oogenesis of other mammals has therefore remained elusive.

However, ...  
... PIWI-deficient female mice are fertile ...  
... and mouse oocytes express a panel ...  
... of small RNAs ...  
... that do not appear widely representative ...  
... of mammals, ...  
... and piRNA function ...  
... in the oogenesis ...  
... of other mammals has therefore remained elusive.

**S1 [004]**      Recent studies revealed the small RNA and PIWI transcriptional profiles in golden hamster oocytes more closely resemble that of humans than mice.

Recent studies revealed the small RNA ...  
... and PIWI transcriptional profiles ...  
... in golden hamster oocytes more closely resemble ...  
... that of humans ...  
... than mice.

**S1 [005]**      Herein, we generated PIWIL1-, PLD6- and MOV10L1-deficient golden hamsters and found that all female mutants were sterile, with embryos arrested at the two-cell stage.

Herein, ...  
... we generated PIWIL1-, ...  
... PLD6- ...  
... and MOV10L1-deficient golden hamsters ...  
... and found ...  
... that all female mutants were sterile, ...  
... with embryos arrested ...

... at the two-cell stage.

**S1 [006]** In PIWIL1 mutant oocytes, we observed transposon accumulation and broad transcriptomic dysregulation, while zygotic gene activation was impaired in early embryos.

In PIWIL1 mutant oocytes, ...  
... we observed transposon accumulation ...  
... and broad transcriptomic dysregulation, ...  
... while zygotic gene activation was impaired ...  
... in early embryos.

**S1 [007]** Intriguingly, PIWIL1-piRNAs exhibited a unique, preferential silencing of endogenous retroviruses (ERVs), whereas silencing LINE1s depended on both PIWIL1- and PIWIL3-piRNAs.

Intriguingly, ...  
... PIWIL1-piRNAs exhibited a unique, ...  
... preferential silencing ...  
... of endogenous retroviruses ...  
... (ERVs), ...  
... whereas silencing LINE1s depended ...  
... on both PIWIL1- ...  
... and PIWIL3-piRNAs.

**S1 [008]** Moreover, we showed that piRNAs participate in the degradation of maternal mRNAs in MII oocytes and embryos via partially complementary targets.

Moreover, ...  
... we showed ...  
... that piRNAs participate ...  
... in the degradation ...  
... of maternal mRNAs ...  
... in MII oocytes ...  
... and embryos ...  
... via partially complementary targets.

**S1 [009]** Together, our findings demonstrate that piRNAs are indispensable for generating functional oocytes in golden hamster, and show the informative value of this model for functional and mechanistic investigations of piRNAs, especially those related to female infertility.

Together, ...  
... our findings demonstrate ...  
... that piRNAs are indispensable ...  
... for generating functional oocytes ...  
... in golden hamster, ...  
... and show the informative value ...  
... of this model ...  
... for functional ...  
... and mechanistic investigations ...  
... of piRNAs, ...  
... especially those related ...  
... to female infertility.

**S2 [011]**    Over the past two decades, substantial progress has been made towards understanding the transcriptional and post-transcriptional regulatory systems in gene expression mediated by small RNAs.

Over the past two decades, ...  
... substantial progress has been made towards understanding the transcriptional ...  
... and post-transcriptional regulatory systems ...  
... in gene expression mediated ...  
... by small RNAs.

**S2 [012]**    Among these, PIWI-interacting RNAs (piRNAs) are single-stranded small RNAs, 18-30 nt in length, that are predominantly expressed in germ cells and bind with PIWI proteins to form piRNA-induced silencing complexes (piRISCs), which provide diverse and indispensable functions in gametogenesis (1-6).

Among these, ...  
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... and bind ...  
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... to form piRNA-induced silencing complexes ...  
... (piRISCs), ...  
... which provide diverse ...  
... and indispensable functions ...  
... in gametogenesis ...  
... (1-6).

**S2 [013]**    The primary function of the piRNA pathway is to suppress active transposable elements (TEs) by post-transcriptional gene silencing (PTGS) through piRISC-mediated slicer activity, as well as transcriptional gene silencing (TGS) through guiding DNA methylation or histone modification (7, 8).

The primary function ...  
... of the piRNA pathway is ...  
... to suppress active transposable elements ...  
... (TEs) ...  
... by post-transcriptional gene silencing ...  
... (PTGS) ...  
... through piRISC-mediated slicer activity, ...  
... as well ...  
... as transcriptional gene silencing ...  
... (TGS) ...  
... through guiding DNA methylation ...  
... or histone modification ...  
... (7, 8)...

...

**S2 [014]** Moreover, increasing evidence has shown that the piRNA pathway could also regulate mRNAs and lncRNAs (9-12), and are functional in tissue regeneration (13, 14), tumor biology (15, 16), and embryogenesis (17-19).

Moreover, ...  
... increasing evidence has shown ...  
... that the piRNA pathway could also regulate mRNAs ...  
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... and are functional ...  
... in tissue regeneration ...  
... (13, 14)...  
... , ...  
... tumor biology ...  
... (15, 16)...  
... , ...  
... and embryogenesis ...  
... (17-19).

**S2 [015]** In *Drosophila* and Zebrafish, disruption of any of the PIWI paralogs severely impairs the fertility of both males and females (20-23).

In *Drosophila* ...  
... and Zebrafish, ...  
... disruption ...  
... of any ...  
... of the PIWI paralogs severely impairs the fertility ...  
... of both males ...  
... and females ...  
... (20-23).

**S2 [016]** In mammals, the piRNA pathway has been primarily studied in mice, whose genome encodes three PIWIs, including PIWIL1 (MIWI), PIWIL2 (MILI), and PIWIL4 (MIWI2).

In mammals, ...  
... the piRNA pathway has been primarily studied ...  
... in mice, ...  
... whose genome encodes three PIWIs, ...  
... including PIWIL1 ...  
... (MIWI), ...  
... PIWIL2 ...  
... (MILI), ...  
... and PIWIL4 ...  
... (MIWI2).

**S2 [017]** Disruption of any PIWIs in mice leads to spermatogenesis arrest and sterility in males (24-26).

Disruption ...  
... of any PIWIs ...  
... in mice leads ...  
... to spermatogenesis arrest ...

## **End of Sample Audit**

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