

## **Early embryonic mutations<sup>1</sup> reveal dynamics of somatic and germ cells lineages in mice**

In mammals, new mutations (DNA sequence changes) are known to occur naturally at the time of cell division. It has been difficult until now, however, to investigate how such mutations occur during the cell-division process starting from fertilized eggs.

This paper's research succeeded in developing a novel technique that, by analyzing biological samples from adult mice utilizing a next-generation sequencer,<sup>2</sup> can be used to track what kind of mutations have occurred at each cell division following egg fertilization. The study revealed, among other information, that in the early embryonic stage of development, one mutation on average is newly generated per cell division.

Because it utilizes naturally occurring mutations that occur at cell division, the method has the potential for similar analyses of human embryos. The method can be used to reveal cell lineage following egg fertilization, information that was difficult to obtain previously. With that, the technique greatly advances understanding of the mechanisms underlying mammalian development from a cellular stage and onset of numerous diseases.

In future, the method is expected to be utilized in the medical field and might also be used to clarify mechanisms underlying mutation occurrence from radiation exposure and other mutagens<sup>3</sup> and illuminate health effects from such mutations in living organisms.

### Notes

<sup>1</sup> Early embryonic mutation(s):

Indicates changes in the order (sequence) of genomic DNA in the early stages of development of a multicellular organism (what is known as the embryo) following fertilization. In humans, when genomic DNA is passed down from parents to children, around 70 to 100 mutations are estimated to occur per generation.

<sup>2</sup> Next-generation sequencer:

A device for examining the sequence of nucleic acids (substances in the cell nucleus, located at the center of the cell) in genomic DNA. With recent technological development, the decoding of the entire sequences of human and mouse genomic DNA is now relatively easy to do.

<sup>3</sup> Mutagen(s):

Refers to a substance(s) that causes damage to DNA and induces DNA-sequence

changes, in other words mutations.

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RERF's objective with this brief outline is to succinctly explain our research for the lay public. Much of the technical content of the original paper has been omitted. For further details about the study, please refer to the full paper published by the journal.