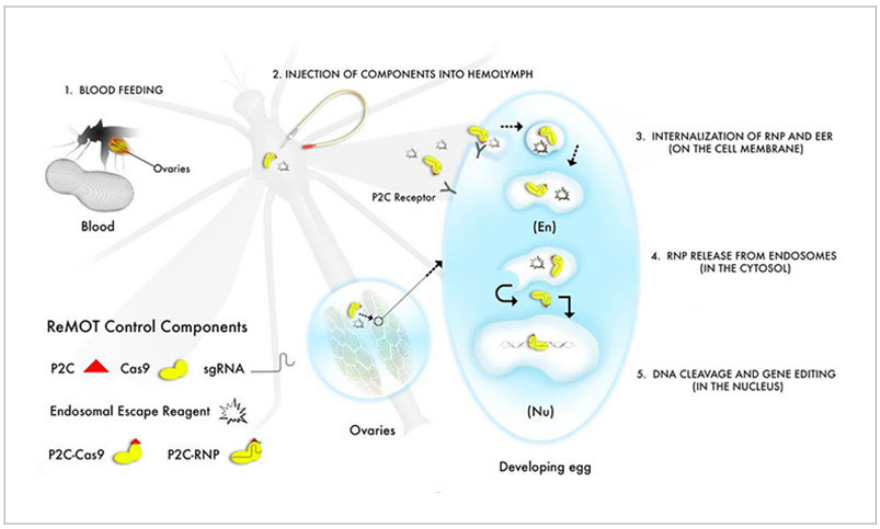
Rapid, Simple Germline-Stable Gene Editing

ID# 2017-4582



ReMOT Control Rationale

Technology Summary

Inventors have developed a novel ‘in utero’ method for gene editing, circumventing the need for embryo injections. A small targeting peptide preferentially binds to oocytes and mediates transduction of a compound to cells which express a suitable receptor. By exploiting an endogenous receptor-mediated endocytosis uptake pathway conserved across oviparous animals, the inventors have repeatedly targeted molecular cargo to the oocytes of An. gambiae and Ae. aegypti. A specific amino acid targeting peptide successfully mediated Cas9 uptake into the ovaries and, coupled with endosomal release reagent, the Cas9 RNP complex specifically targeted the desired genes in an heritable manner. The targeting moieties can be attached to effectors (labels, drugs, antimicrobials, polynucleotides) to form chimeric constructs for specific applications delivering the effector to the target oocyte.

Application & Market Utility

The inventors have reduced the invention to practice in mosquitoes demonstrating its suitability for other Dipteran species that are disease vectors. The easy, low-cost technique has utility for any animal that undergoes vitellogenesis; this encompasses most invertebrates and non-mammalian vertebrates. In non-mammalian vertebrates, oogenesis occurs in an analogous manner to arthropods: major reproductive proteins are made in the liver, secreted into the blood, and taken into developing eggs. These proteins can be exploited for species-specific targeting ligand development.

Next Steps

The invention is currently being optimized/customized for broad application of Cas9-mediated gene editing technology to other species recalcitrant to traditional embryonic microinjection techniques.

TECHNOLOGY READINESS LEVEL 1-3

Seeking

Investment | Licensing | Research

Keywords

- CRISPR/Cas9
- targeted drug delivery
- gene editing
- genetic engineering
- insects

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