

Claims

1. A complex comprising a Cas Ω nuclease and at least one preselected guide RNA designed for binding to at least one target RNA.
2. The complex according to claim 1, further bound to a target RNA molecule having a sequence that is at least 90% complementary to said guide RNA, and wherein said target RNA is preferably flanked by at least one RNA protospacer-adjacent motif (rPAM).
3. The complex according to claim 1 or 2, wherein said guide RNA comprises a sequence selected to be specific for a bacterium, a sequence selected to be specific for a virus, a sequence selected to be specific for a fungus, a sequence selected to be specific for a protozoan, a sequence selected to be specific for a genetic disorder, and a sequence selected to be specific for a proliferative disorder.
4. The complex according to any one of claims 1 to 3, wherein said nuclease comprises a nuclear localization signal.
5. Method for cleaving a nucleic acid molecule selected from dsDNA, ssDNA, and RNA, comprising the steps of a) providing at least one Cas Ω nuclease enzyme, b) providing at least one preselected guide RNA, c) forming a complex between the least one Cas Ω nuclease enzyme and the at least one preselected guide RNA, d) binding of the complex of c) to a target RNA based on the at least one preselected guide RNA, and e) cleaving said nucleic acid molecule selected from dsDNA, ssDNA, and RNA by the at least one Cas Ω nuclease enzyme.
6. A method for detecting at least one target RNA in a cell, tissue, cellular nucleus, and/or sample, said method comprising:
 - a) providing at least one ssDNA, dsDNA or RNA reporter nucleic acid in said cell, tissue, cellular nucleus, and/or sample,
 - b) contacting said cell, tissue, cellular nucleus, and/or sample with at least one complex between at least one Cas Ω nuclease enzyme and at least one preselected guide RNA,

wherein said at least one preselected guide RNA comprises a sequence that is at least 90% complementary to the target RNA, and

c) detecting a cleaving, cutting and/or nicking of said at least one ssDNA, dsDNA or RNA reporter nucleic acid, wherein detecting said cleaving the at least one reporter nucleic acid detects said at least one target RNA in said cell, tissue, cellular nucleus and/or sample.

7. The method according to claim 6, wherein detecting said cleaving, cutting and/or nicking of the at least one reporter nucleic acid comprises detecting a change in the signal of a suitable label, such as a dye, a fluorophore, or electrical conductivity, and/or detecting the said cleaved at least one reporter nucleic acid fragment itself.

8. The method according to claim 6 or 7 wherein the at least one target RNA is a mutated target RNA comprising at least one mutation compared to a control target RNA.

9. A method for modulating expression of at least one target RNA in a cell, tissue, cellular nucleus, and/or sample, wherein said at least one target RNA is selected from an mRNA, non-coding RNA and a viral RNA molecule, said method comprising:

a) contacting said cell, tissue, cellular nucleus, and/or sample with at least one complex between at least one Cas Ω nuclease enzyme and at least one preselected guide RNA, wherein said at least one preselected guide RNA comprises a sequence that is at least 90% complementary to the at least one target RNA, and

c) binding the complex of b) to the at least one target RNA and thereby altering the stability, processing, or translation of the at least one target RNA,

whereby the binding in c) modulates the expression of at least one target RNA in the cell, tissue, cellular nucleus, and/or sample.

10. A method for editing the sequence of at least one target RNA in a cell, tissue, cellular nucleus, and/or sample, wherein said at least one target RNA is selected from an mRNA, non-coding RNA and a viral RNA molecule, said method comprising:

a) contacting said cell, tissue, cellular nucleus, and/or sample with at least one complex between at least one modified and catalytically inactive Cas Ω nuclease enzyme complexed with at least one RNA-modifying enzyme and at least one preselected guide

RNA, wherein said at least one preselected guide RNA comprises a sequence that is at least 90% complementary to the at least one target RNA, and

c) binding the complex of b) to the at least one target RNA, and editing of the at least one target RNA by said at least one RNA-modifying enzyme.

11. The method according to any one of claims 5 to 10, wherein the at least one target RNA comprises a nucleic acid sequence that is specific for a disease state, such as, for example, for cells selected from the group consisting of cells exhibiting a genetic disorder, cells exhibiting a proliferative disorder, such as cancer cells, immune cells that produce autoantibodies, cells infected with bacterial or viral pathogens, bacterial pathogens, protozoan pathogens, cells of microbiota, and contaminating bacteria or archaea.

12. Use of the complex according to claim 3 or 4 for the production of a medicament for the prevention and/or treatment of diseases, such as for example, for the production of a medicament for the prevention and/or treatment of infections and/or genetic disorder, such as proliferative disorders, such as cancer, fungal, protozoan, bacterial and/or viral infections.

13. Method for specifically inactivating an undesired cell or virus, comprising contacting said cell or virus with a complex according to any one of claims 1 to 4, wherein said guide RNA is specifically selected for said undesired cell or virus to be inactivated.

14. Use of the complex according to any one of claims 1 to 4 for cleaving a nucleic acid molecule selected from dsDNA, ssDNA, and RNA, for detecting at least one target RNA in a cell, tissue, cellular nucleus, and/or sample, for modulating expression of at least one target RNA in a cell, tissue, cellular nucleus, and/or sample, for editing the sequence of at least one target RNA in a cell, tissue, cellular nucleus, and/or sample, for specifically inactivating an undesired cell or virus, or for decontaminating a preparation from an undesired contaminant.