

Claims:

1. A method for cleaving a modified target DNA, the method comprising:
converting 5caC and/or 5fC in a target DNA to dihydrouracil (DHU) to provide a modified target DNA; and
contacting the modified target DNA comprising one or more DHU with one or more endonucleases that cleave the modified target DNA at, or adjacent to, the one or more DHU.
2. The method of claim 1, wherein the method further comprises, prior to the converting step, modifying a target DNA comprising 5mC and/or 5hmC comprising the step of converting the 5mC and/or 5hmC in the target DNA to 5-carboxylcytosine (5caC) and/or 5-formylcytosine (5fC).
3. The method of claim 2, wherein the method further comprises, prior to the converting the 5mC and/or 5hmC step, modifying the target DNA comprising 5mC and 5hmC comprising the step adding a blocking group to the 5hmC in the target DNA.
4. The method of claim 3, wherein the blocking group added to the 5hmC is a sugar.
5. The method according to any one of claims 2 to 4, wherein the step of converting the 5mC and/or 5hmC in the target DNA to 5caC and/or 5fC comprises contacting the target DNA with a ten eleven translocation (TET) enzyme.
6. The method of claim 5, wherein the TET enzyme is selected from the group consisting of human TET1, TET2, and TET3; murine Tet1, Tet2, and Tet3; *Naegleria* TET (NgTET); *Coprinopsis cinerea* (CcTET) and derivatives or analogues thereof.
7. The method of claim 6, wherein the TET enzyme is NgTET, murine TET2, human TET1, or derivatives thereof.
8. The method of claim 2 to 4, wherein the step of converting the 5hmC to 5caC and/or 5fC comprises contacting the target DNA with an oxidizing agent.
9. The method of claim 8, wherein the oxidizing agent is potassium perruthenate, Cu(II)/TEMPO, potassium ruthenate, or manganese oxide.
10. The method according to any one of claims 1 to 9, wherein the step of converting the 5caC and/or 5fC to DHU comprises contacting the target DNA with a reducing agent.

11. The method of claim 10, wherein the reducing agent is selected from the group consisting of pyridine borane, 2-picoline borane (pic-BH₃), borane, sodium borohydride, sodium cyanoborohydride, and sodium triacetoxyborohydride.
12. The method according to any one of claims 1 to 11, wherein the one or more endonucleases are selected from one or more of the group consisting of Apurinic/apyrimidinic Endonuclease 1 (APE 1), Uracil DNA glycosylase (UDG), Endonuclease III, *Tma* Endonuclease III, *Tth* Endonuclease IV, Endonuclease V, Endonuclease VIII, Formamidopyrimidine DNA Glycosylase (Fpg), and hNEIL1.
13. The method of claim 12, wherein the endonuclease comprises Uracil-Specific Excision Reagent (USER).
14. The method of any one of claims 1 to 13, further comprising the step of adding adapter DNA molecules to the cleaved modified target DNA.
15. The method of any one of claims 1 to 14, further comprising detecting the sequence of the cleaved modified target DNA, wherein the presence of a cleavage site provides the location of either a 5caC or 5fC in the target DNA.