What is claimed is:

1. A composition comprising a population of oligonucleotides, wherein oligonucleotides of the population are composed of nucleoside molecules linked together through phosphate backbone linkages, wherein 50% to 80% of the phosphate backbone linkages in each oligonucleotide are p-ethoxy backbone linkages, wherein 20% to 50% of the phosphate backbone linkages in each oligonucleotide are phosphodiester backbone linkages.

2. The composition of claim 1, wherein the oligonucleotides of the population have a size ranging from 7 to 30 nucleotides.

3. The composition of claim 2, wherein the oligonucleotides of the population have an average size of 7 nucleotides, wherein no more than 5 of the phosphate backbone linkages in each oligonucleotide is a p-ethoxy backbone linkage.

4. The composition of claim 2, wherein the oligonucleotides of the population have an average size of 30 nucleotides, wherein no more than 24 of the phosphate backbone linkages in each oligonucleotide is a p-ethoxy backbone linkage.

5. The composition of claim 2, wherein the oligonucleotides of the population have an average size of 18 nucleotides, wherein no more than 14 of the phosphate backbone linkages in each oligonucleotide is a p-ethoxy backbone linkage.

6. The composition of claim 1, wherein the population of oligonucleotides comprises a single species of oligonucleotides.

7. The composition of claim 1, wherein the population of oligonucleotides comprises at least two species of oligonucleotides.

8. The composition of claim 1, wherein the population of oligonucleotides comprises antisense oligonucleotides, short interfering RNAs, microRNAs, or piwiRNAs.

9. The composition of claim 1, wherein the oligonucleotides of the population inhibit the expression of at least one oncogenic protein, infectious agent protein, or self-antigen.

10. The composition of claim 1, wherein the oligonucleotides of the population hybridize with at least one oncogenic oligonucleotide, infectious agent oligonucleotide, or self-antigen oligonucleotide.

11. The composition of claim 1, further comprising phospholipids and wherein the oligonucleotides and phospholipids form an oligonucleotide-lipid complex.

12. The composition of claim 11, wherein the phospholipids are uncharged or have a neutral charge at physiologic pH.

13. The composition of claim 12, wherein the phospholipids are neutral phospholipids.

14. The composition of claim 13, wherein the neutral phospholipids are phosphatidylcholines.

15. The composition of claim 13, wherein the neutral phospholipids are dioleoylphosphatidyl choline.

16. The composition of claim 11, wherein the phospholipids are essentially free of cholesterol.

17. The composition of claim 11, wherein the phospholipids and oligonucleotides are present at a molar ratio of from about 5:1 to about 100:1.

18. The composition of claim 11, wherein the oligonucleotide-lipid complex is further defined as a population of liposomes.

19. The composition of claim 18, wherein at least 90% of the liposomes are less than 5 microns in diameter.

20. The composition of claim 18, wherein the population of oligonucleotides is incorporated in the population of liposomes.

21. The composition of claim 1, wherein the composition is lyophilized.

22. A pharmaceutical composition comprising a composition according to claim 11 and a pharmaceutically acceptable carrier.

23. An ex-vivo method for delivering a therapeutically effective amount of an oligonucleotide to a cell comprising contacting the cell with a pharmaceutical composition of claim 22.

24. The composition of claim 1, wherein the oligonucleotides of the population are not chimeric.

25. The composition of claim 1, wherein the phosphodiester backbone linkages in each of the oligonucleotides of the population are randomly spaced throughout each oligonucleotide.