CLAIMS

1. A kit for performing a multiplexed assay of RNA and protein from a sample, the kit comprising:

a) at least one pair of protein-detecting proximity probes, wherein each pair of protein-detecting proximity probes comprises:

a first protein-detecting probe comprising a first antibody that binds to a target protein joined to a first polynucleotide that comprises an I segment at the 3′ end that is complementary to an I segment on the 3′ end of a second probe; and

a second protein-detecting probe comprising a second antibody that binds to the target protein joined to a second polynucleotide that comprises an I segment complementary to the I segment at the 3′ end of the first polynucleotide of the first probe;

wherein binding of the first antibody to the target protein and binding of the second antibody to the target protein allows the I segment of the first protein proximity probe to hybridize to the I segment of the second protein proximity probe to form a duplex;

b) a polymerase for extending the duplex to provide an extended product; and

c) primers that together amplify the extended product, or subregion thereof; and amplify two or more target nucleic acid sequences in the same reaction mixture.

2. The kit of claim 1, wherein the primers are packaged as an admixture in the same composition.

3. The kit of claim 1, further comprising one or more labels for detecting amplicons produced in step c).

4. The kit of claim 1, further comprising reagents to isolate single cells.

5. The kit of claim 1, further comprising reagents to lyse single cells.

6. The kit of claim 1, further comprising a microfluidic device for isolating and lysing single cells.

7. The kit of claim 1, wherein the kit comprises compatible probes provided in admixture.

8. The kit of claim 1, further comprising reagents for performing a quantitative amplification reaction.

9. The kit of claim 8, wherein the quantitative amplification reaction is qPCR.

10. The kit of claim 1, wherein the polymerase is a DNA polymerase having 3′ exonuclease activity.

11. The kit of claim 1, further comprising a DNA polymerase for performing step (c) that is different from the DNA polymerase employed in the extension reaction of step (b).

12. The kit of claim 11, wherein the DNA polymerase for performing step (c) is a thermostable polymerase.

13. The kit of claim 1, further comprising reagents for detecting a target RNA sequence and an amplicon obtained by amplifying an extended product of a nucleic acid proximity extension reaction.

14. The kit of claim 1, wherein RNA of a cell in the sample comprises the target nucleic acid sequences.

15. A method of evaluating a single cell for RNA and protein of interest, the method comprising performing a multiplexed assay on a single cell to detect RNA and protein with a kit comprising:

a) at least one pair of protein-detecting proximity probes, wherein each pair of protein-detecting proximity probes comprises:

a first protein-detecting probe comprising a first antibody that binds to a target protein joined to a first polynucleotide that comprises an I segment at the 3′ end that is complementary to an I segment on the 3′ end of a second probe; and

a second protein-detecting probe comprising a second antibody that binds to the target protein joined to a second polynucleotide that comprises an I segment complementary to the I segment at the 3′ end of the first polynucleotide of the first probe;

wherein binding of the first antibody to the target protein and binding of the second antibody to the target protein allows the I segment of the first protein proximity probe to hybridize to the I segment of the second protein proximity probe to form a duplex;

b) a polymerase; and

c) primers that together amplify the extended product or subregion thereof and amplify two or more target nucleic acid sequences in the same reaction mixture.