CLAIMS

1. A method of modulating the activity of target cells, the method comprising:

a.) producing the primed red blood cells by contacting red blood cells with at least one agent that modulates the level of one or more proteins associated with the red blood cells,

wherein the one or more proteins associated with the red blood cells are cytokines, chemokines, or growth factors, and

wherein the at least one agent is a protein, a protease inhibitor, or a cell; and

b.) mixing the target cells with one or more primed red blood cell components selected from the group consisting of:

(i) the primed red blood cells;

(ii) supernatant obtained from incubating or culturing the primed red blood cells;

(iii) lysate obtained from the primed red blood cells;

(iv) membranes obtained from the primed red blood cells; and

(v) red blood cell ghosts produced from the primed red blood cells,

wherein the mixing the target cells with the one or more primed red blood cell components is *in vitro* or *ex vivo*; and

wherein mixing the target cells with the one or more primed red blood cell components modulates the activity of the target cells.

2. The method of claim 1, wherein the primed red blood cells modulate one or more activities of the target cells selected from the group consisting of cell signalling, immune response, cell development, cell growth, cell death, inhibition of cell growth, and cell repair.

3. The method of claim 1 or claim 2, wherein the target cells are one or more selected from the group consisting of immune cells, immortalized cells, cancer cells, stem cells, endothelial cells, fibroblasts, and synovial cells.

4. The method of any one of claim 1-3, wherein the target cells are from a subject.

5. The method of any one of claim 1-5, wherein the target cells are suitable for administration to a subject.

6. The method of any one of claims 1-5, wherein the one or more proteins associated with the red blood cells is selected from the group consisting of FGF basic, Eotaxin, G-CSF, GM-CSF, IFN-γ, IL-IB, ILlra, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-12(p70), IL-13, IL-15, IL-17, IP-10, MCP-1, MIP-lα, MIP-lB, PDGF-BB, RANTES, TNF-α, and VEGF.

7. The method of any one of claims 1-5, wherein the one or more proteins associated with the red blood cells is selected from the group consisting of IL-la, IL-2Ra, IL-3, IL-12, IL-16, IL-18, CTACK, GRO-α, HGF, IFN-α2, LIF, MCP-3, M-CSF, MIF, MIG, B-NGF, SCF, SCGF-B, SDF-lα, TNF-B, and TRAIL.

8. . Use of the primed red blood cells and/or the target cells according to any one of claims 1-7 in the manufacture of a medicament for preventing, treating, or ameliorating a disease or disorder in a subject; wherein the disease or disorder is selected from the group consisting of cancer, infectious disease, organ failure, autoimmune disease, autoimmune disorders, inflammation, and immune deficiency.

9. The use of claim 8, wherein the primed red blood cells and/or the target cells are suitable for administration to the subject by one or more routes selected from the group consisting of systemically, locally, intravenously, subcutaneously, intra-articularly, intramuscularly, intrathecally, and intraperitoneally.

10. The use of claim 8 or claim 9, wherein the subject is a human or non-human mammal.