

## Efficient Gene Transfer into Lymphocytes

### Background

Introduction of exogenous genes into primary B lymphocytes has therapeutic potential for the treatment of diseases that affect B cell compartment, such as X-linked agammaglobulinemia, and genetic diseases such as hemophilia and lipoprotein lipase deficiency. The antigen presenting function of B cell would be especially useful in augmenting anti-tumor or anti-viral immune response. Several gene therapy protocols involving retroviral mediated gene transfer into lymphocytes are currently being used. Many of these protocols rely on long-term *in vitro* expansion of cells and drug selection of stably infected cells. These protocols are not suitable for introduction of exogenous genes into B cells as they require long-term expansion of cells *in vitro*, resulting in loss of homing patterns upon introduction of cells into the host. **The present invention provides a protocol for transferring exogenous genes into primary lymphocytes without the need for drug selection of stably infected cells.**

### Description of the Technology

Scientists at UMDNJ have devised a protocol for the efficient transfer of exogenous genes into primary lymphocytes. The primary steps involve the stimulation of enriched lymphoid subpopulation with growth factors specific to the subpopulation to induce proliferation of the cells followed by co-culturing the stimulated cells with helper cell line that is infected with a retroviral vector. Greater than 90% of the lymphocytes produced using this protocol are enriched for the provirus with one to five copies of the exogenous gene per cell. Furthermore, the transferred gene is expressed at high levels in the infected cells. This protocol is rapid as it eliminates the selection step required by other methods to enrich for the target population of cells that express the exogenous gene. As a result, the homing properties of the cells are not compromised upon their introduction into the host.

### Advantages

- High titers of the retroviral vector containing the exogenous gene
- A specific subpopulation of lymphocytes can be isolated and enriched.
- The protocol is rapid and efficient

### Applications

- To transfer of genes into lymphoid cells such as primary, mature lymph node T and B cells and primary immature CD4-CD8- double negative thymocytes.
- For the treatment of genetic disorders involving lymphocytes.

### Patent Status

- Three United States patents granted on September 16, 1997, and November 11, 1997, and May 25, 1999
- Patent Number: 5,667,998, 5,686,280 and 5,906,928

### Licensing Opportunity

This technology is available for licensing non-exclusively.

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