1 Somatic Gene Therapy in Cancer

F.M. Rosenthal, C.F. Waller, A. Lindemann, and R. Mertelsmann

1.1 Background

Cancer is rapidly becoming the leading medical cause of death in Western society. Currently, the most important treatment modalities in clinical oncology are surgery, radiotherapy, and chemotherapy with cytostatic or cytotoxic drugs. Even though important progress has been
Table 1. Gene transfer techniques

1. Non-viral methods
1.1 Physical methods
   - Electroportion
   - Microinjection
   - Particle bombardment
   - Lipofection
1.2 Chemical methods
   - Calcium phosphate co-precipitation
1.3 Receptor-mediated transfer
   - DNA/protein complexes
   - DNA/virus complexes

2. Viral vectors
2.1 Retroviruses
2.2 Adenoviruses
2.3 Adeno-associated viruses
2.4 Herpes simplex viruses
2.5 Other: Eppstein-Barr viruses, HIV, Vaccina viruses, Polio viruses, SV40 viruses

3. Bacterial vectors
   *Salmonella, Listeria*

made using these therapeutic modalities alone or in combination, treatment results have been stagnating in recent years in many types of cancer, especially in those which occur more frequently, such as lung cancer or cancer of the colon, in spite of intensive clinical research.

Investigation of cancer cells with molecular techniques has provided new insights into the pathogenesis and pathophysiology of cancer. It has been shown that tumors arise secondary to genetic changes in cells, which result in abnormal proliferation of the mutated cell clone. A better understanding of tumor pathogenesis and progress in molecular biology, cell biology, and immunology has now provided the foundation for the development of new therapeutic strategies for patients with cancer.

Gene therapy is the introduction of a gene into a cell which then produces the desired gene product and thus corrects a genetic defect or acquires a new function (Anderson 1984; Friedman 1992). Somatic