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The Pharmacology of Gene Therapy

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The objective for human gene therapy is to express exogenous DNA at a site in vivo for long enough, and at sufficient levels to produce a therapeutic response. The obstacles to this objective are numerous and include the formulation or packaging of the DNA, in vivo delivery, penetration of biological barriers, DNA elimination within the cell and from the tissue compartments of the whole body, control of product expression and overt toxicity. The current challenge is to resolve each of these obstacles to produce a practical and efficient gene therapy. In doing so, it is vital to understand the disposition of DNA vectors in vivo, and to know how conventional medicines may be used to modulate this disposition and to enhance the therapeutic effect of these vectors. Many of the general concepts of human gene therapy have been reviewed extensively in the literature. This review discusses some of the pharmacological aspects of gene delivery and the fate of vectors in vivo, and then highlights how drugs are being used to modulate gene therapy.

Key words: ganciclovir; gene targeting; genetic engineering; gene therapy; gene transfer; regulation of gene expression; somatic gene therapy; transfection; transgenes; vectors, genetic