



WPRE: A Powerful Tool to Significantly Increase Gene Expression from Retroviral Vectors

INVENTION: Salk Institute scientists have identified cis-acting RNA elements from the Woodchuck Hepatitis Virus (WHV) that substantially increase the expression of transgenes delivered by retroviral vectors, in particular WHV's post-transcriptional regulatory element (WPRE). Insertion of specific WPRE in the 3' untranslated region of coding sequences carried by either oncoretroviral or lentiviral vectors substantially increased levels of gene expression in a transgene-, promoter- and vector-independent manner.

APPLICATIONS:

- Expression of transgenes for gene therapy protocols and basic research
- Increased expression of mRNA, siRNA, shRNA, and miRNA
- WPRE antisense derivative inhibits targeted gene expression

ADVANTAGES:

- Significantly increases transgene expression
- Safer and more efficacious than other RNA export elements
- Approved for use in gene therapy application in Europe
- Increased expression is not cell type or species specific

BACKGROUND: Retroviral vectors are used for many applications, in particular as a gene delivery system as they have a large packaging capacity and an efficient integration machinery. One shortcoming of retroviral vectors, however, is their frequent inability to generate high levels of gene expression, particularly in vivo. Many steps are involved in the regulation of gene expression, including post-transcriptional processes. Therefore, it may be possible to improve the expression of transgenes delivered by retroviral vectors through the addition of elements known to increase gene expression post-transcriptionally. The woodchuck hepatitis virus has a post-transcriptional regulatory element (WPRE) and our investigators found that it can substantially stimulate the expression of transgenes delivered by retroviral vectors, including spliced mRNAs and intronless transcripts. WPRE is a powerful tool for both basic research and gene therapy protocols.

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