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(71) Applicant *(for all designated States except US)*: VIROMED LIMITED [KR/KR]; c/o Technology Business Incubator, IMBG, BLDG-105, Seoul National University, San 56-1 Shinrim-dong, Kwanak-ku, Seoul 151-742 (KR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: KIM, Sunyoung [KR/KR]; #18-302 Hangang Mansion Apt., 300-127 Ichon-dong, Yongsan-ku, Seoul 140-030 (KR). YU, Seung, Shin [KR/KR]; #123-103 Olympic Apt., Pangee-dong, Songpa-ku, Seoul 138-050 (KR). KIM, Jong-Mook [KR/KR]; #202-1603 Hyundai Apt., 296 Pongcheon-dong, Kwanak-ku, Seoul 151-057 (KR).

(74) Agent: LEE, Won-Hee; Suite 805, Sung-ji Heights II, 642-16 Yoksam-dong, Kangnam-ku, Seoul 135-080 (KR).

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(54) Title: HIGH EFFICIENCY RETROVIRAL VECTORS THAT CONTAIN NONE OF VIRAL CODING SEQUENCES

(57) Abstract

The present invention relates to improved retroviral vectors for gene therapy. In this invention, retroviral vectors with higher safety and efficiency are constructed from MLV-based starting vectors, MON and MIN. The improved vectors have following features: 1) sequences corresponding to MLV-derived *pol* gene are completely deleted in the vectors, avoiding homologous recombination which has been a baffling problem in conventional retroviral vectors, 2) a heterologous intron, splicing acceptor and/or non-coding sequence are/is inserted into the upstream position of cloning site, maximizing the expression of a foreign gene through efficient splicing, 3) the vectors contain either the full-length U3 sequence of 5' LTR or a strong heterologous promoter instead, permitting the abundant production of RNA, 4) either IRES (Internal Ribosomal Entry Site) or internal SV40 minimal promoter is inserted into the downstream position of cloning site, enabling the simultaneous expression of two or more foreign genes. Since the improved retroviral vectors of this invention turn out to be safe and to express the foreign gene efficiently, they are useful for gene therapy and the like.

