CLAIMS

[Claim 1]. A mesenchymal stem cell (MSC) for anticancer comprising ~~a recombinant~~ an oncolytic adenovirus, ~~comprising~~ wherein the oncolytic adenovirus comprises a target gene, ~~and~~ a sequence of SEQ ID NO: 1 and the E1A gene; and the E1B 19kDa gene is deleted in the oncolytic adenovirus; and wherein the mesenchymal stem cell is infected for 50 hours or less with the oncolytic adenovirus, and can be administered intravenously.

[Claim 2]. The mesenchymal stem cell for anticancer of claim 1, wherein the ~~recombinant~~ oncolytic adenovirus further comprises a gene expression regulatory sequence ~~that regulates the expression of the target gene~~ comprising, in a 5' to 3' direction, (a) a domain sequence of 1 to 10 copies of a hypoxia-response element (HRE), (b) a sequence of 1 to 10 copies of alpha-fetoprotein (AFP) enhancer A, (c) a sequence of one copy of AFP promoter enhancer B, and (d) a TERT promoter, a PSA promoter, a PSMA promoter, a CEA promoter, an E2F promoter or an AFP promoter sequence; and a target gene that is operatively linked to the gene expression regulatory sequence.

[Claim 3]. The mesenchymal stem cell for anticancer of claim 2, wherein the oncolytic adenovirus comprises the gene expression regulatory sequence ~~comprises~~ of an AFP promoter sequence of SEQ ID NO: 5 or a TERT promoter sequence of SEQ ID NO: 8.

[Claim 4]. The mesenchymal stem cell for anticancer of claim ~~1~~ 2, wherein the ~~mesenchymal stem cell is infected for 50 hours or less with a recombinant adenovirus comprising the target gene and the sequence of SEQ ID NO: 1 at a concentration of greater than 0.01 MOI to less than 100 MOI~~ oncolytic adenovirus comprises the domain sequence of 6 copies of an HRE and the sequence of 2 copies of alpha-fetoprotein (AFP) enhancer A.

[Claim 5]. A composition for ~~delivering a~~ gene delivery for intravenous administration~~, the composition~~ comprising a mesenchymal stem cell~~, in which a recombinant adenovirus comprising a target gene and a sequence of SEQ ID NO: 1 is loaded~~ wherein the mesenchymal stem cell comprises an oncolytic adenovirus comprising a target gene, a sequence of SEQ ID NO: 1 and the E1A gene, and the E1B 19kDa gene is deleted in the oncolytic adenovirus, and is infected for 50 hours or less with an oncolytic adenovirus.

[Claim 6]. The composition for gene delivery of claim 5, wherein the ~~recombinant~~ oncolytic adenovirus further comprises a gene expression regulatory sequence ~~that regulates~~ for regulating the expression of the target gene of an AFP promoter sequence of SEQ ID NO: 5 or a TERT promoter sequence of SEQ ID NO: 8.

[Claim 7]. The composition for gene delivery of claim 5, wherein the ~~composition is for systemic administration or local administration~~ oncolytic adenovirus further comprises a gene expression regulatory sequence comprising, in a 5' to 3' direction, (a) a domain sequence of 1 to 10 copies of a hypoxia-response element (HRE), (b) a sequence of 1 to 10 copies of alpha-fetoprotein (AFP) enhancer A, (c) a sequence of one copy of AFP promoter enhancer B, and (d) a TERT promoter, a PSA promoter, a PSMA promoter, a CEA promoter, an E2F promoter or an AFP promoter sequence; and a target gene that is operatively linked to the gene expression regulatory sequence.

[Claim 8]. The composition for gene delivery of claim ~~5~~ 7, wherein the ~~composition comprises a mesenchymal stem cell infected for 50 hours or less with a recombinant adenovirus comprising the target gene and the sequence of SEQ ID NO: 1 at a concentration of greater than 0.01 MOI to less than 100 MOI~~ oncolytic adenovirus comprises the domain sequence of 6 copies of an HRE and the sequence of 2 copies of alpha-fetoprotein (AFP) enhancer A.

[Claim 9]. A pharmaceutical composition for ~~treating~~ cancer treatment~~, the pharmaceutical composition~~ for intravenous administration comprising a ~~pharmaceutically effective amount of a~~ mesenchymal stem cell~~, (MSC) in which a recombinant adenovirus~~ wherein the mesenchymal stem cell comprises an oncolytic adenovirus comprising a target gene~~, and~~ a sequence of SEQ ID NO: 1 ~~is loaded~~ and the E1A gene, and the E1B 19kDa gene is deleted in the oncolytic adenovirus, and is infected for 50 hours or less with an oncolytic adenovirus.

[Claim 10]. The pharmaceutical composition for cancer treatment of claim 9, wherein the ~~recombinant~~ oncolytic adenovirus further comprises a gene expression regulatory sequence ~~that regulates~~ for regulating the expression of ~~the~~ a target gene of an AFP promoter sequence of SEQ ID NO: 5 or a TERT promoter sequence of SEQ ID NO: 8.

[Claim 11]. The pharmaceutical composition for cancer treatment of claim ~~9~~ 5, wherein the ~~composition comprises a mesenchymal stem cell infected for 50 hours or less with a recombinant adenovirus comprising the target gene and the sequence of SEQ ID NO: 1 at greater than 0.01 MOI to less than 100 MOI~~ oncolytic adenovirus further comprises a gene expression regulatory sequence comprising, in a 5' to 3' direction, (a) a domain sequence of 1 to 10 copies of a hypoxia-response element (HRE), (b) a sequence of 1 to 10 copies of alpha-fetoprotein (AFP) enhancer A, (c) a sequence of one copy of AFP promoter enhancer B, and (d) a TERT promoter, a PSA promoter, a PSMA promoter, a CEA promoter, an E2F promoter or an AFP promoter sequence; and a target gene that is operatively linked to the gene expression regulatory sequence.

[Claim 12]. ~~A recombinant adenovirus with enhanced stem cell transduction potency comprising a serotype 35 fiber knob~~The pharmaceutical composition for cancer treatment of claim 11, wherein the oncolytic adenovirus comprises the domain sequence of 6 copies of an HRE and the sequence of 2 copies of alpha-fetoprotein (AFP) enhancer A.

~~13. The recombinant adenovirus of claim 12, wherein the serotype 35 fiber knob consists of a sequence of SEQ ID NO: 1.~~

~~14. The recombinant adenovirus of claim 12, wherein the recombinant adenovirus further comprises a target gene and a gene expression regulatory sequence that regulates the expression of the target gene.~~

~~15.~~[Claim 13]. ~~The~~ A recombinant adenovirus ~~of claim 12, wherein the recombinant adenovirus~~ comprises: a gene expression regulatory sequence comprising, in a 5' to 3' direction, (a) a sequence of 6 copies of a hypoxia-response element (HRE), (b) a sequence of 2 copies of alpha-fetoprotein (AFP) enhancer A, (c) a sequence of one copy of AFP promoter enhancer B, and (d) an AFP promoter sequence or a TERT promoter sequence; a target gene that is operatively linked to the gene expression regulatory sequence; and a serotype 35 fiber knob sequence.