

implanted stem cells may enable prediction of future teratoma formation. Pluripotency marker related promoter driven reporter gene system may help detect the differentiation status of a stem cell.

[0005] To overcome the shortcomings of each modality, a multimodality approach may be useful, which detect a plurality of different reporter gene expression. Moreover, a robust method to monitor the stem cell activity using non-invasive reporter gene imaging technique in living animal is a highly desirable goal.

BRIEF DESCRIPTION

[0006] The ~~disclosureinvention~~ generally comprises an expression vector comprising one or more reporter sequence(s). The ~~disclosureinvention~~ further comprises methods and kits for monitoring cellular activity by imaging reporter nucleic acid expression.

[0006a] In a first aspect, there is provided an expression vector, comprising:

a first reporter nucleic acid sequence operably linked to a first expression control sequence comprising at least one Oct4 promoter; and
a second reporter nucleic acid sequence operably linked to a second expression control sequence comprising a response element, wherein the response element comprises at least four repeats of GATA-4 protein-binding sequence that is responsive to binding of one or more response element specific protein GATA-4.

[0006b] In a second aspect, there is provided a cultured cell comprising the expression vector as defined above.

[0006c] In a third aspect, there is provided an in vitro method for monitoring a stem cell, comprising:

delivering a first expression vector comprising a first reporter nucleic acid sequence and a second reporter nucleic acid sequence to the stem cell; and
monitoring the stem cell by imaging at least one of the first or second reporter nucleic acid sequence expression,
wherein the first reporter nucleic acid sequence is operably linked to a first expression control sequence comprising at least one Oct4 promoter, and the second reporter nucleic acid sequence is operably linked to a second expression control sequence comprising a response element, wherein the response element comprises at least four repeats of GATA-4 protein-binding sequence that is responsive to binding of one or more response element specific protein GATA-4.

[0006d] In a fourth aspect, there is provided a kit for monitoring stem cells, comprising:

an expression vector, wherein the expression vector comprises:

a first reporter nucleic acid sequence operably linked to a first expression control sequence; and

a second reporter nucleic acid sequence operably linked to a second expression control sequence,

wherein the first expression control sequence comprises an Oct4 promoter, and the second expression control sequence comprises a response element, wherein the response element comprises at least four repeats of GATA-4 protein-binding sequence that is responsive to the binding of a GATA4 protein.

[0007] An example of an expression vector for monitoring stem cells comprises a first reporter nucleic acid sequence operably linked to a first expression control sequence and a second reporter nucleic acid sequence operably linked to a second expression control sequence. The first expression control sequence comprises a promoter. The second expression control sequence comprises a response element that activates or inactivates in response to one or more stages of cell differentiation or dedifferentiation

[0008] An example of an expression vector comprises a first reporter nucleic acid sequence operably linked to a first expression control sequence; and a second reporter nucleic acid sequence operably linked to a second expression control sequence. The first expression control sequence comprises a promoter for one or more pluripotency markers. The second expression control sequence comprises a response element that is responsive to binding of one or more response element specific proteins.

[0009] An example of a method for monitoring a stem cell comprises delivering a first expression vector comprising a first reporter nucleic acid sequence and a second reporter nucleic acid sequence to the stem cell; and monitoring the stem cell by imaging at least one of the first or second reporter nucleic acid sequence expression. The first reporter