

[Summary]

In one aspect, there is provided the use of any one of the following substances (a) to (i) in the production of an agent for mobilizing a bone marrow mesenchymal stem cell to peripheral blood from bone marrow, which is to be administered to blood vessel or muscle:

- (a) an HMGB1 protein;
- (b) a cell that secretes an HMGB1 protein;
- (c) a vector inserted with a DNA encoding an HMGB1 protein;
- (d) an HMGB2 protein;
- (e) a cell that secretes an HMGB2 protein;
- (f) a vector inserted with a DNA encoding an HMGB2 protein;
- (g) an HMGB3 protein;
- (h) a cell that secretes an HMGB3 protein; and
- (i) a vector inserted with a DNA encoding an HMGB3 protein.

[Means for Solving the Problems]

There is a possibility that during the survival process of a grafted skin on biological tissue, bone marrow-derived cells are mobilized to the skin graft from non-skin tissue and thus participate in skin tissue regeneration. This suggests a potential mechanism for mobilizing such pluripotent bone marrow-derived cells to peripheral blood. The present invention enables to mobilize a large number of bone marrow-derived pluripotent stem cells into peripheral blood by intravenously administering a skin tissue extract or bone marrow-derived pluripotent stem cell inducer. Specifically, the present invention revealed for the first time in the world that:

- (1) bone marrow-derived pluripotent tissue stem cells can be induced in peripheral blood by intravenously administering a tissue extract prepared from isolated skin pieces;
- (2) the substance in isolated skin pieces, which is responsible for mobilizing bone marrow-derived pluripotent tissue stem cells to peripheral blood, is HMGB1; and
- (3) HMGB1 that has the activity of mobilizing bone marrow-derived pluripotent stem cells to peripheral blood can be easily purified from cultured cells.

Based on the findings described above, the present invention provides the following inventions:

[1] an agent for mobilizing a bone marrow cell to peripheral blood from bone marrow, which is administered to blood vessel or muscle, and which comprises the component of any one of:

- (a) an HMGB1 protein;
- (b) a cell that secretes an HMGB1 protein;
- (c) a vector inserted with a DNA encoding an HMGB1 protein;

- (d) an HMGB2 protein;
- (e) a cell that secretes an HMGB2 protein;
- (f) a vector inserted with a DNA encoding an HMGB2 protein;
- (g) an HMGB3 protein;
- (h) a cell that secretes an HMGB3 protein; and
- (i) a vector inserted with a DNA encoding an HMGB3 protein;
- [2] an agent for mobilizing a bone marrow cell to peripheral blood from bone marrow, which is produced by a method comprising the step of immersing a cell or tissue in a solvent, and which is administered to blood vessel or muscle;
- [3] an agent for mobilizing a bone marrow cell to peripheral blood from bone marrow, which is administered to blood vessel or muscle, and which comprises a heparin-binding fraction produced by a method comprising the steps of:
 - (a) immersing a cell or tissue in a solvent;
 - (b) contacting immobilized heparin with an extract prepared in step (a); and
 - (c) eluting a heparin-binding fraction from the immobilized heparin;