受験番号：32IPB003

問 1.

START

[0004]

Silkworms are classified into a univoltine strain, a bivoltine strain, and a multivoltine strain based on their life cycle. The univoltine strain develops to the adult stage once a year when grown under natural conditions. Many strains of silkworm are univoltine. The univoltine silkworms are known to diapause in the egg stage, and this nature is maintained in microinjected eggs. To generate a genetically modified silkworm in a short time without causing the diapause of eggs, nondiapausing mutant strains or multivoltine, nondiapausing strains are typically used. However, these strains, which are experimental strains, have problems in measurable traits and other traits, requiring the production of nondiapausing eggs from practical diapausing strains to industrially use silkworms as hosts for mass production.

END

問 2.

START

In the method of the present invention for preparing an extract for cell-free protein synthesis, the middle silk gland of a silkworm strain that does not specifically produce fibroin can be easily extracted even using a conventional method of extracting the middle silk gland of a wild-type silkworm strain (see Japanese Patent Laid-Open No. 2007-210902), compared with a conventional method of preparing the extract using the posterior silk gland and fat body. The present inventors have developed a method of extracting the middle silk gland of the silkworm strain that does not specifically produce fibroin in a short time compared with the conventional method, as mentioned below.

END

問 3.

START

After cultured with Gnetin C for 24 hours, AML-MT cells were stained with annexin-FITC and analyzed using flow cytometry or were adsorbed on a slide glass with

a Cytospin, stained with Giemsa, and assessed for cell morphology under a light microscope. AML-MT cells were also cultured with Gnetin C at an indicated concentration for 12 hours, stained with a Mitocapture reagent, and then observed under a fluorescence microscope. In the annexin V staining assay and the Giemsa stain, the cell proliferation inhibitory effect of Gnetin C on AML cells induced typical morphological features of apoptosis including cell membrane protrusions, aggregated chromatin, nuclear fragmentation, and condensed basophilic cytoplasm. These features were similar to those observed in apoptosis induction of patient-derived AML cells. Interestingly, Gnetin C-treated cells significantly decreased their membrane potentials. This indicates that cell apoptosis induced by Gnetin C is caused by mitochondrial membrane dysfunction in AML cells.
END

問 4.
START
Claim 1.

A function improving agent for an immunologically exhausted $CD8^+$ T cell, comprising a biguanide antidiabetic drug selected from the group consisting of phenformin, buformin, and metformin.

Claim 2.

The function improving agent according to claim 1, wherein the function improving agent restores a cytokine production capacity of the immunologically exhausted $CD8^+$ T cell.

Claim 3.

The function improving agent according to claim 2, wherein the immunologically exhausted T cell expresses an exhaustion marker, and the function improving agent restores a cytokine production capacity of the immunologically exhausted $CD8^+$ T cell expressing the exhaustion marker.

Claim 4.

The function improving agent according to any of claims 1 to 4, wherein the function improving agent suppresses apoptosis of a $CD8^+$ T cell.

Claim 5.

A therapeutic agent for cancer in a cancer patient with immunological exhaustion, wherein the therapeutic agent comprises the function improving agent according to any of claims 1 to 4 as an active ingredient.

Claim 6.

The therapeutic agent according to claim 5, wherein the immunological exhaustion is caused by expression of an exhaustion marker on a $CD8^+$ T cell.

Claim 7.

The therapeutic agent according to claim 6, wherein the exhaustion marker is selected from the group consisting of Program cell death protein 1 (PD-1) and T cell membrane protein 3 (Tim-3).

Claim 8.

The therapeutic agent according to any of claims 5 to 7, wherein the active ingredient is administered to a cancer patient who has not been experienced chemotherapy and radiotherapy for cancer.

END