rpc00084

Nicotiana tabacum NI cell suspension culture

Components

- Domestic delivery: A 50-mL plastic conical centrifuge tube, containing cell suspension
- Overseas delivery: A 250-mL plastic Erlenmeyer flask, containing cells placed on semi-solid medium

Notice

- Subculture the cells to fresh medium immediately after arrival [Notes I, II].
- Do not store the cell culture in a refrigerator and a freezer.
- Maintain aseptic conditions of the cell culture, and work in a laminar flow cabinet.

Method

- Culture medium: mLS medium, 10 μM NAA, 1 μM kinetin, pH 5.7 (medium no. 55) [Materials III]
- Culture conditions: 24°C, continuous light, 90 rpm [Methods II]
- Subculture: 21-day intervals [Methods I]

Citation of cell line

When results obtained by using this cell line are published in a scientific journal, it should be cited in the following manner: "*Nicotiana tabacum* NI cell line (rpc00084) was provided by the RIKEN BRC through the National BioResource Project of the MEXT, Japan."

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Introduction

Tobacco NI cell line was established from a pith of *Nicotiana tabacum* L. cultivar Samsun NN (Takeda *et al*. 1990). The NI is a green photoautotrophic cell culture, which can grow in the light without organic carbon sources (Yamada and Sato 1978). The NI cells are grown in a modified Linsmaier and Skoog (mLS) medium supplemented with 10 µM 1-naphthaleneacetic acid (NAA) and 1 µM kinetin, pH 5.7. Our NI cell culture has been maintained under the continuous light at 24°C with rotary shaking at 90 rpm and subcultured at 21-day intervals.

Materials

Chemicals and stock solutions

(All stock solutions are stored at 4°C)

A) MS salt mix

Murashige and Skoog Plant Salt Mixture, FUJIFILM Wako Pure Chemical Corporation (#392-00591)

B) Sucrose

C) LS_VT

Thiamine·HCl	0.16 mg/mL
myo-Inositol	40 mg/mL

D) NAA (1 mM)

NAA·K	0.224 mg/mL

Potassium 1-naphthylacetate, FUJIFILM Wako Pure Chemical Corporation (#161-04021)

E) Kinetin (1 mM)

Kinetin	0.215 mg/mL

Dissolve kinetin in small volume of KOH (1 N), and fill up with distilled water

F) KOH (1 N)

Glassware and equipment

A) Erlenmeyer flask (100 mL), capped with two layers of aluminum foil

B) Laboratory dispensing spoon (head size, 1.2 × 0.8 cm), sterilized before use

Preparation of mLS medium (medium no. 55)

1. Dissolve the following chemicals in approximately 800 mL of distilled water.

MS salt mix	1 bag (1 L)
Sucrose	30 g

2. Add following stock solutions, and fill up to approximately 950 mL with distilled water.

LS_VT	5 mL
NAA (1 mM)	10 mL
Kinetin (1 mM)	1 mL

3. Adjust the pH of the solution to 5.7 with KOH (1 N), and fill up to 1 L with distilled water.

4. Pour 25 mL of the medium into a 100-mL flask.

5. Autoclave the flask at 121°C for 20 min.

Methods

1. Transfer one to two spoons of cells from a 21-day-old culture into 25 mL of fresh mLS medium with a laboratory dispensing spoon.

2. Incubate cell cultures on a rotary shaker at 90 rpm under the continuous light condition (photosynthetic photon flux density 50–60 μmol m^{-2} s^{-1}) at 24°C.

Notes

- For domestic customers: We send NI cell suspension in a 50-mL disposable conical centrifuge tube. The cells should be transferred to fresh mLS medium immediately after arrival.

- For overseas customers: We send NI cells placed on semi-solid mLS medium in a 250-mL disposable Erlenmeyer flask. The cells should be transferred to fresh mLS medium immediately after arrival. Collect the cells from the semi-solid medium with a spatula and transfer them to Erlenmeyer flasks containing fresh liquid medium.

- In order to maintain NI cell suspension cultures stably, it is essential to transfer an adequate amount of cells to fresh mLS medium in every subculture. The amount of cells may vary from one lab to another, because proliferation of NI cells is affected by culture conditions, such as a room temperature, rotation speed of a rotary shaker, and aeration condition of the culture.

- In order to obtain good aeration of a suspension culture, a silicone sponge plug may be used instead of the aluminum foil cap (*e.g.*, cap-type Silicosen; Shin-Etsu Polymer, Tokyo, Japan; https://www.shinpoly.co.jp/en/product/product/medical/plugs.html).

- NI cells completely absorb the culture medium after 21 days of culture. The green NI cells can grow after subculturing into a fresh medium.

References

Takeda S, Sato F, Ida K, Yamada Y (1990) Characterization of polypeptides that accumulate in cultured *Nicotiana tabacum* cells. Plant & Cell Physiology 31: 215–221. DOI: 10.1093/oxfordjournals.pcp.a077895

Yamada Y, Sato F (1978) The photoautotrophic culture of chlorophyllous cells. Plant & Cell Physiology 19: 691–699. DOI: 10.1093/oxfordjournals.pcp.a075640

Appendix A: Formulation of culture medium

Table A.1. modified Linsmaier and Skoog medium
(medium no. 55)

Chemical	Concentration (mg/L)
KNO_3	1900
NH_4NO_3	1650
$CaCl_2 \cdot 2H_2O$	440
$MgSO_4 \cdot 7H_2O$	370
KH_2PO_4	170
H_3BO_3	6.2
$MnSO_4 \cdot 4H_2O$	22.3
$ZnSO_4 \cdot 7H_2O$	8.6
KI	0.83
$Na_2MoO_4 \cdot 2H_2O$	0.25
$CuSO_4 \cdot 5H_2O$	0.025
$CoCl_2 \cdot 6H_2O$	0.025
$FeSO_4 \cdot 7H_2O$	27.8
Na_2-EDTA	37.3
Thiamine·HCl	0.8
myo-Inositol	200
Sucrose	30000
NAA·K	2.24
Kinetin	0.215