Nov 14, 2022

Antioxidant rescue of C. elegans behaviour on Keio E. coli mutants (6-well plates)

Forked from Antioxidant rescue of C. elegans behaviour on Keio E. coli mutants

DOI
dx.doi.org/10.17504/protocols.io.j8nlkw5kdl5r/v1

Saul Moore[1]

[1]Imperial College London, MRC London Institute of Medical Sciences (LMS)

Behavioural Genomics

Saul Moore

DOI: https://dx.doi.org/10.17504/protocols.io.j8nlkw5kdl5r/v1

Protocol Citation: Saul Moore 2022. Antioxidant rescue of C. elegans behaviour on Keio E. coli mutants (6-well plates). **protocols.io https://dx.doi.org/10.17504/protocols.io.j8nlkw5kdl5r/v1**

Protocol status: Working
We use this protocol and it's working

Created: September 10, 2022

Last Modified: November 14, 2022

Protocol Integer ID: 69801

Keywords: antioxidant rescue, antioxidant, gene deletion mutant, behaviour on keio, mutant, effects on caenorhabditis, keio

Disclaimer

DISCLAIMER – FOR INFORMATIONAL PURPOSES ONLY; USE AT YOUR OWN RISK

The protocol content here is for informational purposes only and does not constitute legal, medical, clinical, or safety advice, or otherwise; content added to **protocols.io** is not peer reviewed and may not have undergone a formal approval of any kind. Information presented in this protocol should not substitute for independent professional judgment, advice, diagnosis, or treatment. Any action you take or refrain from taking using or relying upon the information presented here is strictly at your own risk. You agree that neither the Company nor any of the authors, contributors, administrators, or anyone else associated with **protocols.io**, can be held responsible for your use of the information contained in or linked to this protocol or any of our Sites/Apps and Services.

Abstract

Protocol for screening candidate behaviour-modifying *E. coli* BW25113 single-gene deletion mutants from the 'Keio Collection', to investigate their effects on *Caenorhabditis elegans* behaviour in the presence of antioxidants.

Materials

6-well flat bottom plates ('imaging plates')

60mm Petri plates ('maintenance plates')
90mm Petri plates ('nursery plates')
50mL Erlenmeyer flasks

500mL LB
1L NGM agar (for ingredients, see protocol for making NGM agar)

Troubleshooting

Preparing NGM agar + pouring plates

1 Prior to screening, prepare the materials needed for screening *C. elegans* on selected Keio *E. coli* mutants:

- 6-well plates (aka. 'imaging plates')
- 15 mL Falcon tubes
- 50 mL Erlenmeyer flasks
- 90 mm Petri plates (aka. 'maintenance plates')
- 150 mm Petri plates (aka. 'nursery plates')

2 Make 1L normal Nematode Growth Media (NGM) agar, following the protocol:

Protocol

NAME

Making normal NGM for imaging plates (Cabreiro Lab)

CREATED BY

Saul Moore

Preview

3 Pour 15 mL NGM agar into each 60 mm maintenance plate, and 35 mL NGM agar into each 90 mm nursery plate, following the protocol for Plate pouring (dx.doi.org/10.17504/protocols.io.6bhhaj6).
Keep the remaining agar warm in a water bath set to 65°C, for pouring into 6-well imaging plates afterwards

4 Using the Integra ViaFill, dispense 4 mL NGM agar into each well of the 6-well plates, following the protocol:

Protocol

NAME

Dispensing agar into multiwell plates

CREATED BY

Ida Barlow

Preview

5 Leave the plates on the lab bench (with lids on) until the agar has cooled and solidified (approximately 1 hour, timing depends on humidity)

6 Measure the weight of 3 imaging plates (with lids on) and record average plate weight on day of pouring

7 Dry the imaging plates under a hood (or drying cabinet) until the plates lose between 3-5% of their original plate weight (with lids on)

8 Store the imaging plates upside-down at 4°C until used for experiments

Preparing worms

9 Inoculate 10ml LB broth media with *E. coli* BW25113 (Keio background wild-type strain, used as negative control and for raising worms, no Kanamycin) in an Erlenmeyer flask for overnight culture following the protocol:

Protocol

NAME

Inoculating a Liquid Bacterial Culture

CREATED BY

Priota Islam

Preview

10 Place the inoculation in a shaking incubator at 37°C at 200 rpm and leave to grow overnight

11 Remove the BW culture from the shaking incubator and place in 4°C fridge until seeding

12 Remove the plates from storage and the BW culture from the fridge, and leave on the bench for approximately 30 minutes to acclimate to room temperature

13 Using aseptic technique, seed the 60 mm maintenance plates each with approximately 250 µL of BW25113 culture

14 Leave under hood until dry (with lids on, timing depends on humidity)

15 Using a platinum pick, gently pick 30 adult N2 Bristol *C. elegans* onto each maintenance plate, and store in an incubator at 20°C

16 After 24 hours, remove the adult worms, leaving the eggs behind to hatch into L1 larvae

17 Inoculate a further 10 mL LB broth with BW25113 bacteria for overnight culture (no Kanamycin), following the protocol in and place in a shaking incubator at 37°C, 200 rpm

18 After 24 hours, remove the culture from the incubator, and the 90 mm nursery plates from storage, and leave to acclimate on bench top for 30 minutes

19 Seed the nursery plates each with approximately 1 mL of fresh BW25113 culture. Leave under hood until dry

20 Wash the worms off the BW-seeded maintenance plates, into two 15ml Falcon tubes

21 Perform an egg prep on worms in the Falcon tubes, following the protocol:

Protocol

NAME

Egg Prep for Bleach Synchronization (Cabreiro Lab)

CREATED BY

Saul Moore

Preview

22 At around noon the next day, wash L1 larvae off the empty plate and re-feed onto the BW-seeded nursery plates using a glass Pasteur pipette. Aim to dispense around 500 worms per plate. Incubate at 20°C

Preparing bacteria

23 Fill 2 separate Erlenmeyer flasks with 25 mL LB. Add 50µg/ml Kanamycin to one flask, and leave the other flask without Kanamycin for the BW25113 control.

24 Remove the required Keio frozen stock plates from -80°C containing the strains for antioxidant testing. Gently remove the aluminium film and leave to partially thaw for a minute or so

Safety information

To avoid damaging the bacterial stocks through repeated freeze-thawing, do not let the wells completely defrost. Just enough to be able to pick up some cells with the replicator.

25 Inoculate the Erlenmeyer flasks with the desired strains for antioxidant testing from Keio frozen stock plates, following the protocol:

Protocol

NAME

Inoculating a Liquid Bacterial Culture

CREATED BY

Priota Islam

Preview

26 Incubate the cultures overnight at 37°C in a shaking incubator at 200 rpm.

27 Remove the overnight cultures from the incubator. Inoculate 2 more Erlenmeyer flasks for a second round of overnight cultures from the first, this time without Kanamycin (to avoid exposing the worms to the antibiotics), and incubate overnight at 37°C at 200 rpm.

28 After 24 hours, remove the cultures from the incubator and store at 4°C until used for experiments

Seeding imaging plates (6-well)

29 Remove the imaging plates from 4°C storage

30 Ensure that imaging plates have lost approximately 3-5% of their original weight (so that they are not too wet for imaging when seeded). Place under a hood or drying cabinet until they have.

31 Remove overnight cultures of Keio strains from 4°C storage. Using a pipette, seed 30 µL of bacterial culture into the wells of each 6-well imaging plate.

32 Place the seeded plates under a laminar flow hood to dry for 20 minutes, then place in an incubator at 25°C (no shaking) for 7 hours 40 minutes (total lawn growth time: 8 hours)

33 After 8 hours, remove the plates from the incubator and store at 4°C

Adding antioxidants (6-well)

34 On the day of tracking, remove the seeded imaging plates from 4°C, and dry for 30 minutes under a laminar flow hood

35 Remove the antioxidants from 4°C. Prepare 100 mM NAC or Vitamin C (in H2O).

36 Using a pipette, dispense 40 µL of antioxidant solution into each desired well of the 6-well imaging plates (for a final concentration of 1 mM in 4 mL agar)

37 Leave the plates to dry under a hood for a further 30 minutes. Record the weight of the plates after drying (as weight at imaging)

Picking worms + Hydra tracking (6-well)

38 Prior to tracking, ensure that the imaging cave air conditioning is turned on (and there has not been a power-cut) and also empty the dehumidifier waste water tray (see pre-imaging checklist)

39 Remove the nursery plates from the incubator.

40 Using a platinum worm pick, carefully pick 10 Day1 worms onto the edge of the lawns in each well of the 6-well imaging plates, then place in incubator at 20°C until tracking (at +4 hours on food).

41 30 minutes prior to tracking with the Hydra rig (each run is performed every 20-30 minutes), remove 5 imaging plates from the 20°C incubator and leave to acclimate in the imaging cave.

42 Record worm behaviour on the bacterial food for 15 minutes at the 4-hour timepoint (25 fps, exposure: 25000 msec, blue-light stimulation)

43 After tracking, discard the plates in a biological waste bin

44 Check tracking checklist to ensure that all videos have been saved correctly: '/Volumes/behavgenom$/Documentation/Protocols/analysis/tracking-checklist-20210210.docx'