

It will be apparent to the skilled person that any suitable test compound, such as a compound contained in a combinatorial library, can be used in the method of the present disclosure. It will be further apparent that any compound which, for example, extends the CLS of the test organisms as measured via their mobility will be a candidate compound which may be useful in, for example, combatting the effects of aging or for the treatment of an age related disorder. It will further be apparent that any compound which reduces the CLS of the test organisms may have toxic effects.

According to a ~~second aspect~~ of the present disclosure there is also provided the use of the method according to the first aspect for drug discovery and/or toxicology.

According to a ~~third~~ second aspect of the present disclosure there is provided a method for assessing a change in the viability of a population of organisms comprising subjecting the population to the method of the first aspect.

According to a ~~fourth~~ third aspect of the present disclosure there is provided a method for assessing aging of a population of organisms comprising subjecting the population to the method of the first aspect.

This is achieved by calculating the overall change in the mobility coefficient as observed in an entire population of organisms over time compared to a control population. In a preferred embodiment the organisms are *C. elegans*.

It will be apparent to the skilled person that the organisms can be maintained in any suitable apparatus, for example a petri dish/single well plate or a multi-well plate. In one embodiment, the population is maintained in a single-well plate. In another embodiment, the population is maintained in a well of a multi-well plate, wherein each well comprises a separate population. In further embodiments, the method is carried out using 6 well, 12 well, 24 or 96 well plates. In a preferred embodiment, the method is carried out using 12 well plates.

The skilled person will be aware that FUDR is a chemotherapeutic drug which is used in *C. elegans* studies to prevent the formation of second generation progeny which would otherwise complicate ageing experiments, and to produce age synchronous populations. FUDR prevents DNA synthesis and therefore eggs do not hatch and young worms do not develop. In traditional assays treatment with FUDR occurs by transferring adult worms grown on media, for example, NGM agar plates, in the absence of the drug, to a plate which has been soaked with an FUDR solution (transfer method).

The inventors have discovered that generation of age-synchronous *C. elegans* populations by topical FUDR addition is possible and is preferable to transfer methods because the method can be carried out on a single plate or well without the need to transfer the worms and with the minimum of maintenance.

5

It will be understood that following synchronization of the population in either a single or multi-well plate, the population is treated topically with FUDR, wherein the population is not transferred to a new plate or well.

10 It will be apparent to the skilled person that other drugs which perform the same function as FUDR can equally be used in both the transfer and topical methods.

In a preferred method, following synchronization of the population in a multi-well plate, the population is treated topically with FUDR at a level of at least 0.5µg/ml media, at least 1.0µg/ml, at
15 least 1.5µg/ml, at least 1.7µg/ml, at least 2.0µg/ml, at least 2.5µg/ml, or at least 3µg/ml.

In a first preferred embodiment, following synchronization of the population in a 12 well plate, the population is treated topically with 1.7µg FUDR/ml media.

20 In a second preferred embodiment, following synchronization of the population in a 6 well plate, the population is treated topically with 2µg FUDR /ml media.

In a third preferred embodiment, following synchronization of the population in a 24 well plate, the population is treated topically with more than 2µg FUDR /ml media.

25

It will be apparent to the skilled person that synchronisation of the population should be undertaken prior to obtaining the first image (I1).

According to a ~~fifth~~ fourth aspect of the present disclosure there is provided a computer program comprising instructions operable to configure a data processing apparatus to perform the method
30 according to any of the previous aspects.

The present disclosure will be further described in the Examples with reference to the following figures in which:

35

Figure 1 shows a comparison of FUDR treatment of AM134*bus*-5 mutant *C. elegans* by transfer and topical application techniques on 6 well plates. Images show a synchronised worm population

Claims

1. A method for determining a change in the mobility of a population of organisms over time, said method comprising:
 - a) obtaining a first image (I1) of the population at a first time point (T1),
 - b) obtaining a second image (I2) of the population at a second time point (T2),
 - c) calculating the absolute differences between I1 and I2 ($\Delta D1$),
 - d) obtaining a third image (I3) of the population at a third time point (T3),
 - e) obtaining a fourth image (I4) of the population at a fourth time point (T4),
 - f) calculating the absolute differences between I3 and I4 ($\Delta D2$), and
 - g) calculating the change between $\Delta D1$ and $\Delta D2$ to calculate a change in the mobility of the population as a whole.
2. The method according to claim 1, wherein the time period between I1 and I2 is 100ms to 5 minutes, 140ms to 3 minutes, 200ms to 90s, 300ms to 1 minute, 400ms to 45s, 500ms to 30s, 600ms to 15s, 700ms to 10s, 750ms to 5s, 800ms to 3s, 850ms to 2s, 900ms to 1s, or 1s to 2s.
3. The method according to claim 1 or claim 2, wherein the time period between I2 and I3 is at least 6 hours, at least 12 hours, at least 1 day, at least 2 days, at least 3 days, at least 4 days, at least 5 days, at least 6 days, at least 7 days, at least 8 days, at least 9 days, at least 10 days, at least 11 days or at least 12 days.
4. The method according to claim 1 or claim 2, wherein the time period between I2 and I3 is at least 4 days.
5. The method according to any preceding claim, wherein $\Delta D1$ is calculated from images obtained on day 0.
6. The method according to any preceding claim, wherein $\Delta D2$ is calculated from images obtained on day 4.
7. The method according to any preceding claim, wherein the time period between I1 and I2, and the time period between I3 and I4, are each 100 ms to 5 minutes~~500ms to 10s; or preferably about 1s.~~
8. ~~The method according to any preceding claim, wherein the time period between I1 and I2 is from 1 to 3 minutes.~~
9. The method according to any one of claims 1 to 5, wherein $\Delta D2$ is calculated from images obtained on day 6.

910. The method according to any preceding claim, wherein the population comprises at least 5, at least 10, at least 20, at least 50, at least 75, at least 100, at least 110, at least 120, at least 150, at least 175, at least 200, at least 250, at least 300, at least 350, at least 400, at least 450, at least 500, at least 550, at least 600, at least 650, at least 700, at least 750, at least 800, at least 850, at least 900, at least 950 or at least 1000 organisms.

4011. The method according to any preceding claim, wherein the organisms are labelled.

4412. The method according to claim 4011, wherein the organisms are labelled with green fluorescent protein (GFP).

4213. The method according to claim 4011 or 4412, wherein the label is localised to one particular area within the organisms.

4314. The method according to any of claims 1 to 4213, wherein:
the term population refers to a plurality of organisms that belong to the same group or species, and
the organism is any suitable organism, being an animal, a micro-organism, or a single-celled life form, which is capable of movement.

4415. The method according to any of claims 1 to 4214, wherein:
the term population refers to a plurality of organisms that belong to the same group or species, and
the organism is any suitable animal which is capable of movement.

4516. The method according to claim 4314 or 4415, wherein the term movement refers to locomotion.

4617. The method according to any of claims 1 to 4213, wherein the organisms are *Caenorhabditis elegans* or *Danio rerio*.

4718. The method according to claim 4011, 4412 or 4213, wherein the organisms are *Caenorhabditis elegans*, and the population of *Caenorhabditis elegans* is fluorescently labelled by any suitable means.

4819. The method according to claim 4412 or 4213, wherein the organisms are *Caenorhabditis elegans* expressing green fluorescent protein (GFP), wherein the GFP expression is localised to one particular area within the labelled organisms.

4920. The method according to claim 4412, wherein the organisms are: drug sensitive *Caenorhabditis elegans* worms expressing green fluorescent protein (GFP) in their pharynx (*Caenorhabditis elegans* MYO2bus-5); or *Caenorhabditis elegans* with GFP expression in their
5 body wall muscle.
2021. The method according to any preceding claim, wherein the population is maintained in a single well or multi-well plate.
- 10 2422. A method according to any preceding claim, which is for assessing the effect of at least one test compound or at least one environmental factor on the mobility of the population of organisms.
2223. The method according to claim 2422, which is for assessing the effect of at least one test compound on the mobility of the population of organisms, and wherein the at least one test
15 compound comprises a small molecule or biological composition.
2324. The method according to claim 2422, which is for assessing the effect of at least one environmental factor on the mobility of the population of organisms, and wherein the at least one environmental factor comprises an atmospheric factor, a nutritional supplement or nutritional
20 deficiency, a light condition, and/or a temperature condition.
2425. A method for assessing a change in the viability of a population comprising undertaking a method according to any one of claims 1 to 2021.
- 25 2526. A method for assessing aging of a population comprising undertaking a method according to any one of claims 1 to 2021.
- ~~26. Use of a method according to any one of claims 1 to 25 in drug discovery and/or toxicology.~~
- 30 27. A computer program comprising instructions operable to configure a data processing apparatus to perform a method according to any of claims 1 to 2526.