CRACK IT Rodent Little Brother – Questions and Answers

Q: Why is there a need to monitor individual animals? If they are the same inbred strain in the same cage, surely they should all have the same behaviour – therefore monitoring one would be sufficient?

A: In a true home cage you may get animals of different genotypes (e.g. wild types, heterozygotes and homozygotes) or you may house both the test and control animals. In addition it has been shown that you get variation in behaviour between individuals even if they are genetically identical. Cage hierarchies will also affect behaviour and therefore it is very important to capture the activity of individual mice

Q: What do you want to see at the end of Phase I? An actual product or just proof of concept? What are the key things you want to see by the end of Phase I.

A: We mainly want to see proof of feasibility of the ideas by the end of Phase I, with a preliminary demonstration on how to capture the X, Y, Z co-ordinates of the animals. The deliverables we want to see by the end of the project is a true home cage monitoring system that can track more than one animal. The software that is developed with the system will be the key challenge. It needs to be intuitive, flexible and easy to use. The end users will be post-docs and technicians so this needs to be kept in mind. There are many forms of shareware and freeware already available to tackle these challenges, so you could decide to develop one of these rather than starting from scratch.

Q: You are showing an IVC racking system by Tecniplast, but there are other racking systems available. Does the product need to fit just this racking system or others?

A: From the Harwell perspective, a system that fits just the Tecniplast system is sufficient. This is the system used in all our labs and widely used by other institutes. However, in order to produce a more marketable product it would be in your best interest to produce a more universal product that is adaptable and can be modified for use by different IVC rack systems.

Q: It looks like there will be expertise in ethology required to look at all the video tracking data collected and score the behaviour. This will take a lot of time and effort. Can the sponsor provide someone to do this or should this be factored into the proposal?

A: There are forms of freeware already available to partially cover these issues. Nevertheless, Harwell will make every effort to secure funds for supporting such an individual in-house. However, given the emphasis placed on this feature of the challenge, we would recommend that any group of applicants should also give this due consideration in their application.

Harwell can also provide the mouse models that have already been validated by standard tests. One feature that will be valuable will be to determine whether automated testing allows detection of early onset disease/ behaviour phenotypes.

Q: The new technology may only find the onset of the behaviour, this may not necessarily correlate with the neurological reason for this.

A: This is also a problem with a number of current widely used tests. We are aware of this, but finding out when an animal starts to develop behavioural abnormalities is what we are looking for at this stage. The idea is to identify new phenotypes associated with disease that we and others can then correlate with neuropathology. The aim is not to initially supercede current tests, but to complement them or make them better.

Q: There is a likelihood that you may get different behaviours dependent on which part of the rack is being monitored.

A: Part of the validation process would be to test the whole rack, different cages and different parts of the rack, as we are aware that there may be different conditions in different parts of the system but want to reduce the effects of this as much as possible.

Q: How many cages would you want to monitor?

A: With the current phenotyping "home-cage" set up, we monitor individually housed animals and require 15-20 animals per sex and phenotype, so we need to be able to monitor this number of mice. In a normal home-cage we would house 5 mice per cage so we need to be able monitor 5 cages at once at least with the new system. It will be of benefit to the company to get the system easily scalable to allow for monitoring of as many cages as possible.

Q: Would you accept that you will have to lose some racking space etc and what would you have to keep?

A: We may have to lose some stocking density or some cages and this is fine, as long as we can monitor the required number of animals mentioned. However the IVC standard needs to be maintained. A different type of caging system would involve additional cost so we would not encourage this as part of the solution. The climate control of the racking system needs to be the same, but we are open to changing the airflow system to accommodate ports or electronics. The flow can't be changed for a single cage and it would have to be for the whole rack.

Q: In terms of cost, how much per cage should be aimed for?

A: MRC have recently paid more than £300k for a set of phenotyping equipment, but this will return an enormous amount of data. The cost would depend upon what the information-gain was from the caging. However cost scalability would be good – i.e. pay more if you want more parameters etc.

Q: How do you currently identify individual animals and what type of monitoring would you accept?

A: We currently use ear punch. Video-tracking has been mentioned as a solution but this is not the only option. We would accept a sub-cutaneous telemetry device or possibly an ear tag. But it would be important for all animals to be monitored in the same way. The animals would be aged 3 weeks onwards, with a minimum weight of 10 grams so they would be large enough to be tagged.

Q: In terms of electronic requirements how much storage capacity would you need?

A: Ideally we want the raw data rather than compressed files as raw data is more flexible, but storage can be an issue so the option to compress would be good. However the raw data would still need to be archived/retrievable if compression is the only option.

We use VHP sterilisation so the electronics would not need to be autoclavable.

Q: What are the additional things you would like beyond the requirements of this challenge?

A: The next level of the challenge would be to introduce operant tasks in the home cage set-up – e.g. access to a test cage via a tunnel from the home cage. This is anticipated to be beyond the scope of this particular challenge, but it is the ultimate aim. Also pre-weaning phenotypes would be valuable, but animals cannot be tagged until after weaning so this would have to be an option that does not involve chipping. This challenge is the starting point; Harwell would take the lead in scaling up the solution and pushing it out to other users.

Contact the NC3Rs if you have further questions about this challenge and we can facilitate communication with the Sponsor.

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