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Viability of the marine amphipod Parhyale hawaiensis growth rate as an endpoint for chronic ecotoxicological tests

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Abstract
There is a lack of suitable marine species for ecotoxicological tests. Parhyale hawaiensis is a marine amphipod with circumtropical distribution. Sediment quality assessments using sublethal responses of benthic organisms, such as growth and reproduction, have been used to successfully evaluate moderately contaminated areas. The aim of this work was to evaluate the viability of growth rate as an sublethal endpoint for chronic toxicity tests.

Key words:
Crustacean, ecotoxicity test, sublethal endpoint.

Introduction

Parhyale hawaiensis has become a model for evolutionary and developmental biology research, but its potential for chronic toxicity assessment still unclear[1]. Thus, the aim of this study was to look for the minimum time interval that is possible to observe statistically significant growth to perform chronic testing, based on growth rate data to verify the application of this parameter as sublethal endpoint in chronic toxicity tests.

Results and Discussion

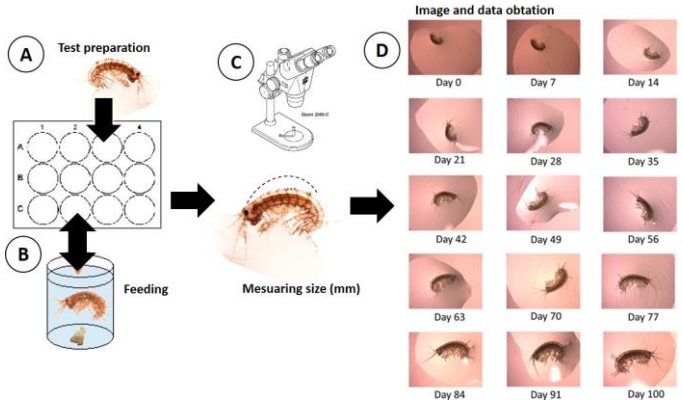

Figure 1. One neonate per well (a). Observation of the activity and condition in each test well (b). Each *P. hawaiensis* was photographed under a stereomicroscope and the cephalothorax was measured (c). Photo taken from each week of a test organism (d).
- Test: 72 organisms;
- Test consisted of 100 days (Figure 1d);
- Organisms at ages < 7 days[1] (Figure 1a);
- 12-well microplates containing 4 mL of artificial seawater (salinity 30 ± 2, Red Sea Salt®; 24 ± 2 °C; 12-h photoperiod; and water quality of 6 ± 2 mg L^{-1} dissolved oxygen; pH 8 ± 1) and one substrate of crushed coral (granulometry #8)[1] (Figure 1a and 1b);
- Three times per week, water was partially (60%) renewed and organisms were fed[2,4] (Figure 1b);
- The organisms were monitored daily for molts and mortality;
- Every week a photo was taken to measure the cephalothorax length (mm) and enable to study the growth rate (Figures 1c and 1d).

It was possible to observe a logistic growth curve (Figure 2). Growth rate was higher in early developmental stages slowing down at later stages[3]. The measured mean lengths of cephalothorax were 1.22 mm and 2.78 mm, on days 0 and 100 respectively. Data were tested for non-parametric attributes, followed by Kruskal-Wallis and Mann-Whitney post-hoc test, with significance level $p<0.05$. Significant growth is observed from 21 days of observation.

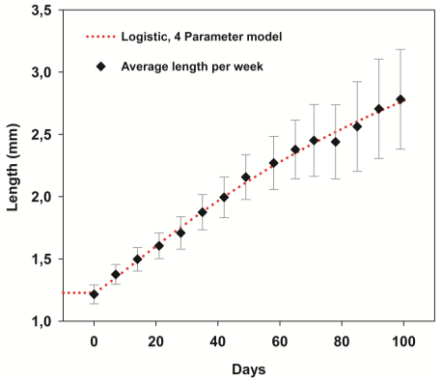

Figure 2. Overview of cephalothorax length data (mm) during 100 days of observation (mean values ± standard deviation).

Conclusions

Thus, to ensure the sensitivity of the endpoint, duration of the test should last at least 21 days. More experiments are going to be conducted with the exposure of neonates to selected toxicants to verify if will affect the growth rate in the developed experimental conditions.

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