Plan Overview

A Data Management Plan created using DMPTool

DMP ID: https://doi.org/10.48321/D1M90N

Title: Impacts of immune system activation on locomotor behavior in invasive and non-invasive anurans.

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Funder: São Paulo Research Foundation (fapesp.br)

Funding opportunity number: 2020/14174-4

Grant: 2020/14174-4

Template: Digital Curation Centre (português)

Project abstract:

Locomotion is essential for survival and requires resources such as energy and metabolites. Thus, locomotion may conflict with other aspects of physiology that also demand resources, such as the activation of the immune system in the face of an infectious process. This conflict can impose limits on immune responses or activity patterns, as the allocation of energy and metabolites for locomotion reduces these resources for immune system activation. Conversely, a depressed immune system can free resources for activities such as locomotion. Previous studies have shown that invasive species may have a depressed immune response allowing them to maintain locomotor

function and reproduction. This may be one of the factors that contributes to the success of invasive species. The present study investigates the impact of a simulated infection on locomotor endurance, jump force, and voluntary movement of anurans of the species *X. laevis*, a globally invasive species, and the congeneric non-invasive *X. allofraseri*. The results showed that the simulated infection reduced the locomotor endurance in both species. Yet, the observed reduction was more accentuated in anurans of the specie of *X. allofraseri*, which presented greater depression. Voluntary movement showed marginal differences between species. Our data suggest that a simulated infection leads to behavioral depression in anurans, and that this depression appears to be less pronounced in invasive species. As such, even sick animals can maintain activities related to dispersal such as locomotion.

Start date: 03-02-2021

End date: 08-31-2021

Last modified: 05-10-2023

Copyright information:

Impacts of immune system activation on locomotor behavior in invasive and non-invasive anurans.

Coleta de Dados

Que dados serão coletados ou criados?

The data generated will be of two types: a) Numerical measurements of variables of locomotor performance and voluntary movement of each animal of each species before and after treatment with LPS. These data will be inserted into spreadsheets in .xlsx format. b) Graphic images obtained after statistical analysis of the data in TIFF format and 1000 dpi quality c) all the data commented above will be compressed in a .zip format file.

Como os dados serão coletados ou criados?

Experimental Groups

Six animals were used for each variable tested (locomotor endurance; jump force; voluntary movement), totaling 18 animals of each species. Animals were tested before (control group) and after LPS injection (treatment group). Therefore, each individual was a control of itself.

Experimental set-up

Locomotor endurance

Animals were tested three times with a rest interval of 48 hours between trials. We recorded the total time spent moving, the total distance covered, and the number of laps.

Jump force

This test was repeated on three days, with 48-hour intervals between tests. Forces were recorded at 500 Hz during 60 second recording sessions and frogs were induced to jump multiple times per session. The three best jumps per session were analyze using the Kistler Bioware software. To do so the peak X-, Y- and Z-forces were extracted and the overall resultant force was calculated.

Voluntary movement

We recorded the total time spent moving, the total time spent in the refuge and the number of times the animal breached the surface for breathing.

Documentação e Metadados

Que documentação e metadados acompanharão os dados?

Tables and graphs.

Ética e Conformidade Legal

Como você administrará qualquer questão ética?

The project was developed with approval and permission from the ethics committee for the use of animals in experiments by the Cuvier Committee at the MNHN.

Como você vai gerenciar os direitos autorais e os direitos de propriedade intelectual (IP / IPR)?

Does not apply to this project.

Armazenamento e Backup

Como os dados serão armazenados e terão backup durante a pesquisa?

The .zip file created will be made available in the scientific data repository of the University of São Paulo (http://dadoscientificos.usp.br) and can be accessed by searching the project title, authors' names, or searching related topics to the research topic, such as "anurans, locomotion, infection, LPS, invasive species, for example.

Como você vai gerenciar o acesso e a segurança?

Only the authors will have access to the data to modify them if necessary. The data will be open for public consultation and may be used as long as they are referenced.

Seleção e Preservação

Quais dados são de valor a longo prazo e devem ser mantidos, compartilhados e / ou preservados?

All data contained in the tables.

Qual é o plano de preservação a longo prazo do conjunto de dados?

Question not answered.

Compartilhamento de Dados

Como você vai compartilhar os dados?

The data are available in the repository of the University of São Paulo (http://dadoscientificos.usp.br) with open access.

Existem restrições ao compartilhamento de dados requeridos?

No.

Responsabilidades e Recursos

Quem será responsável pelo gerenciamento de dados?

The principal researcher Thaysa Gomes de Oliveira.

Quais recursos você precisará para entregar seu plano?

Question not answered.

Planned Research Outputs

Text - "Results"

Body mass and test days

Body mass was significantly different between species (Table 3) with females of *X. laevis* being larger than females of *X. allofraseri* (see Tables 1; 2). There was no difference between test days (Table 3).

Locomotor endurance

Body mass did not differ between control and LPS-injected animals of either species (*X. laevis*: *p*=0.910; *X. allofraseri*: *p*=0.374).

<u>Total time spent moving:</u> The results showed that there was a significant difference with a reduction of 23% of the total time spent moving in females injected with LPS in comparison to control females in *X. allofraseri* (n=6; *f*= 13.2; *p*= 0.002). For *X. laevis* females there was also a statistical difference with a decrease of 21% in the total time spent moving in females injected with LPS (n=6; *f*=13.6; *p*=0.001) (Table 3; fig. 1) compared to the same individuals before injection. There was a significant difference between species before injection (n=12; *p*<0.001); control females of *X. allofraseri* spent 23% less time moving until exhaustion compared to control females of *X. laevis*. After LPS injection the difference between species nearly doubled with *X. allofraseri* showing a 47 % lower endurance compared to *X. laevis* (Table 4; Fig. 1).

<u>Number of laps on the test track:</u> The results showed that there was a significant difference between control females *vs.* females injected with LPS (n=6; *f*= 12.7; *p*= 0.036) in *X. laevis*, with a decrease of 21% after the treatment with LPS. *Xenopus allofraseri* also showed a significant effect (n=6; *f*= 12; *p*=0.003) with a reduction of 41% after treatment with LPS (Table 3; Fig. 1). There was a significant difference between the species (n=12; *p*<0.001), with control females of *X. allofraseri* performing 32% fewer laps on the track compared to females of *X. laevis*. After treatment with LPS, females of *X. allofraseri* showed a reduction of 47% in relation to the females of *X. laevis* showing that the impact of LPS injection was greater in *X. allofraseri* (Table 4; Fig. 1).

<u>Total distance covered on the test track:</u> The results showed that there was a significant difference

between control females *vs.* females injected with LPS (n=6; *f*= 6; *p*= 0.025) in *X. laevis* with a decrease of 19% after treatment with LPS. The results for *X. allofraseri* were also significant (n=6; *f*=12; *p*=0.002), with a reduction of 31% after treatment with LPS (Table 3; fig. 1). There was a significant difference between the species (n=12; *p*<0.001) and females of the species *X. allofraseri* traveled 37% less distance on the track compared to females of the species *X. laevis*. After the injection of LPS *X. allofraseri* covered 46% less distance in relation to *X. laevis* showing that the impact of LPS injection was greater in *X. allofraseri* (Table 4; Fig. 1).

Jump force

The body mass of female *X. laevis* and female *X. allofraseri* did not change after the injection with LPS (*p*=0.057; *p*=0.059, respectively).

The results showed that there was a difference between control *X. laevis vs.* females injected with LPS (n=6; *f*=6.1; *p*=0.025), with a reduction in force of 26% after treatment with LPS. Females of the species *X. allofraseri* also showed a difference in jumping force (n=6; *f*= 4.7; *p*=0.027), with a reduction of 28% in females injected with LPS compared to control females (Table 3; Fig. 2). There was a difference in the jumping force between the species (n=12; *p*<0.001), both in control animals as well as after LPS injections. The results showed a reduction of 28% in females of *X. allofraseri* controls compared to the *X. laevis* controls. After LPS injections the difference was similar (30% - Table 4; Fig. 2).

Voluntary Movement

The body mass did not differ before and after LPS injection for either species (*X. laevis*: *p*=0.134; *X. allofraseri*: *p*=0.119).

Total time spent moving: The results showed that there was a significant difference between control females vs. females injected with LPS (n=6; *f*= 8; *p*=0.013) in *X. allofraseri*, with a reduction of 24% of the time in movement after the treatment with LPS. No significant difference (n=6; *f*= 2.1; *p*=0.163) was observed for *X. laevis* (Table 3; fig.3). There was a difference between the species (n=12; *p*=0.017), with *X. allofraseri* spending 30% less time moving compared to *X. laevis* controls. The difference remained at 31% after treatment with LPS (Table 4; Fig. 3).

Total time spent in the shelter: There was no difference between control females *vs.* females injected with LPS for either *X. laevis* (n=6; *t*= 0.16; *p*=0.688) or *X. allofraseri* (n=6; *t*= 1.9; *p*=0.538) (Table 3; fig. 3). There was a difference between the species (n=12; *p*=0.028) with *X. allofraseri* spending 12% less time in the shelter compared to *X. laevis*. After LPS injection *X. allofraseri* spent 16% less time in the shelter compared to *X. laevis* (Table 4; fig. 3).

Number of breaths: There were no differences between control females *vs.* females injected with LPS in either species (*X. laevis:* n=6; *t*= 2.4; *p*=0.138; *X. allofraseri*: n=6; *t*= 1.9; *p*= 0.186) (Table 3; fig.3). There was a difference between species (n=12; *p*=0.002), with the number of breaths being 24% greater in *X. allofraseri.* After LPS injections the difference between species was similar (22%, Table 4; fig. 3).

Planned research output details

Title	Type	Anticipated release date	Initial access level	Intended repository(ies)	Anticipated file size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
Results	Text	2022-08-09	Open	None specified	6 MB	Creative Commons Attribution 4.0 International	None specified	No	No