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Brief Communication

Reproductivity of Nine *Trichinella* Isolates in Guinea Pigs and Mice

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The choice of experimental animals for *Trichinella* studies is important with respect to animal species and strain. Several studies show variation in reproductivity for different isolates of *Trichinella* in the same species of laboratory animal with strain differences in rats reported among others by *Nelson et al.* (1966), and in mice by *Bolas-Fernandez & Wakelin* (1990) and *Goyal & Wakelin* (1993). Most studies have only dealt with *Trichinella spiralis* and/or very few of the sylvatic isolates. The objective of this study was to evaluate the infectivity of 9 isolates of *Trichinella* in 2 commonly used species of laboratory animals, namely mice and guinea pigs, and also to identify the most suitable host of these 2 for different types of experimental studies and propagation of the parasite. Such comparative studies have never previously been published on guinea pigs. An additional aim was to collect information on the reproduction of sylvatic *Trichinella* in guinea pigs where data are currently only available for *T. spiralis*. Isolates used in this study are listed in Table 1 and comprise isolates of both domestic (T1) and sylvatic (T2, T3, T4, T5, T6, and T7) origin.

In the present study, 28 outbred female guinea pigs (Ssc: AL) approximately 3 months old and 71 outbred female mice (Ssc: CF1) 5-6 weeks of age were inoculated orally with one of the 9 *Trichinella* isolates (1000 larvae/guinea pig and 500 larvae/mouse). Larvae for inoculation were released by digestion of mouse muscle tissue using a combined digestion and sedimentation

Table 1. Trichinella isolates used to inoculate mice and guinea pigs.

Isolate	Species	TRC code	Origin	Original host
T1	*T. spiralis*	ISS004	Maryland, USA	*Sus scrofa*
T2	*T. nativa*	ISS042	Alaska	*Ursus maritimus*
T3	*T. britovi*	ISS100	Italy	*Canis lupus*
T4 USSR	*T. peudospiralis*	ISS013	Caucasus, USSR	*Procyon lotor*
T4 USA	*T. pseudospiralis*	ISS470	Alabama, USA	*Coragyps atratus*
T4 AUST	*T. pseudospiralis*	ISS141	Australia	*Dasyurops maculatus*
T5	*Trichinella* sp.	ISS035	Pennsylvania, USA	*Ursus americanus*
T6	*Trichinella* sp.	ISS034	Montana, USA	*Ursus arctos*
T7	*T. nelsoni*	ISS037	Tanzania, Africa	*Phacochoerus aethiopicus*

All isolates were obtained from The International *Trichinella* Reference Centre (TRC) (*Pozio et al.* 1989).

Table 2. The mean number of muscle larvae and reproductive capacity index of *Trichinella* isolates in experimentally infected mice and guinea pigs.

Trichinella isolate	Mice			Guinea pigs		
	N	Mean no. larvae/ animal (SD)	RCI*	N	Mean no. larvae/ animal (SD)	RCI
T1	8	44063 (11408)	88	3	628972 (120134)	629
T2	8	7525 (1664)	15	3	419951 (85772)	420
T3	8	20088 (6591)	40	3	177620 (85670)	178
T4 USSR	8	17813 (6973)	39	3	219520 (28788)	220
T4 USA	8	19375 (4329)	36	3	192080 (74240)	192
T4 AUST	8	6156 (2969)	12	3	261515 (101257)	262
T5	8	6156 (3714)	12	3	201449 (57990)	201
T6	8	42375 (28987)	85	4	78168 (27222)	78
T7	8	28786 (15278)	53	3	442539 (205060)	443

*RCI: Reproductive capacity index (mean number of larvae recovered/number of larvae inoculated).

technique (*Gamble* 1996) with the same larval batch used to infect both host species. The high inoculation dose was chosen in consideration of the low infectivity of the sylvatic isolates of *Trichinella* in mice (*Pozio et al.* 1992). After 6 weeks animals were killed, skinned and decapitated, and their feet and internal organs removed. The entire carcass from the mice and 50 g of muscle tissue from the guinea pigs were cut into small pieces and then digested using the technique of *Gamble* (1996) to isolate muscle larvae.

All *Trichinella* isolates were infective to the 2 species of laboratory animals, but at different levels. Muscle larvae intensities in mice were comparable with the results of *Bolas-Fernandez & Wakelin* (1989) performed on inbred mice. The mean number of muscle larvae per animal is given in Table 2. For both host species, the highest muscle larvae intensity was obtained by infection with *T. spiralis*, supporting findings by others (*i.e. Leiby & Bacha* 1987). Low intensities were found for *Trichinella* sp. (T5) and *Trichinella pseudospiralis* (T4 AUST) in mice and *Trichinella* sp. (T6) in guinea pigs. Interestingly, *Trichinella* sp. (T6) was found to be highly infective to mice but not guinea pigs while the exact opposite was found with *Trichinella nativa* (T2) even though these are believed to be closely related species (*Bandi et al.* 1995). This result emphasises the importance of carefully selecting host animal species when designing experiments with sylvatic isolates of *Trichinella.*

Higher reproductive capacitity indices (RCI) were obtained in guinea pigs than in mice for all isolates except *Trichinella* sp. (T6) (guinea pigs: 78-629, mice: 12-88) implying that the parasites have a higher reproduction rate in guinea pigs. The RCI for *Trichinella britovi* (T3) and *Trichinella* sp. (T6) was low in guinea pigs but high in mice. Variation in infectivity for the individual *Trichinella* isolates is most likely due to variable host immune responses (*Wakelin & Goyal* 1996). However, it is also possible that sylvatic isolates generate a higher RCI in a sylvatic host than in a laboratory animal host due to evolutionary adaptation to the natural host (*Leiby & Bacha* 1987). In addition to this, the RCI of a certain *Trichinella* isolate can also be affected by consecutive passages through the same host and by the experimental host species (*Chadee & Dick* 1982, *Leiby & Bacha* 1987, *Behnke et al.* 1994). To exclude

this impact, the same larval batch was used to infect both host species in the present study. The RCI has previously been shown to be fairly consistent using different infection doses (*Dea-Ayuela et al.* 1993) indicating that alteration of dose levels would probably not affect the general conclusions of the present study.

Mice are often kept in cages sized 44×27cm with 10 animals in each unit and guinea pigs in 56×37 cm cages with 2 animals in each unit. The high *Trichinella* larvae production in guinea pigs means that a guinea pig unit should yield more larvae than a mouse unit, the larvae production being several times higher for guinea pigs. This knowledge is useful when planning experiments where large amounts of larvae are needed e.g. for production of excretory/secretory antigens. For most experimental purposes the large number of muscle larvae retrieved from guinea pigs is not required and mice would therefore be a sufficient alternative. For the conduction of bioassays a larger number of host animals is needed due to the large variation in larval establishment in outbred animals. In such cases mice take up less space and are cheaper than guinea pigs.

In conclusion, for *Trichinella* studies mice are better hosts for conducting bioassays whereas guinea pigs are better for experiments where large amounts of larvae are desired.

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