Detecting vertical transfer of antibiotic resistance genes in the absence of antibiotics

INTRODUCTION

•Bacteria can develop resistance to antibiotics.

• Hosts can carry a reservoir of resistant bacteria in their microbiome.

•Tetracycline has been used for over 50 years and has enterohepatic circulation, so intestinal microbes are exposed via bilis to the injected antibiotic.

•Our hypothesis is that antibiotic resistance can be vertically transmitted between generations, in the absence of antibiotics. Mothers readily colonize their offspring with bacteria that have antibiotic resistance genes.

•To test this hypothesis, we aimed to detect resistance genes in the offspring of mothers carrying resistance.

METHODOLOGY

•Stool samples were collected from 6 female FVB mice, pre-tetracycline treatment and post-tetracycline treatment.

•Females were crossed with males.

•Intestines from offspring mice were collected at day 1 and 9 after being born (**Figure 1**).

• DNA was extracted from stools and intestines using the MoBio Power Soil Kit, followed by PCR amplification of 16SrDNA genes and five tetracycline resistance genes: *tet*(M), *tet*(O),), *tet*(W), tet(Q) and *tet*(S) (Pei et al. 2004; Villedieu et al. 2003).

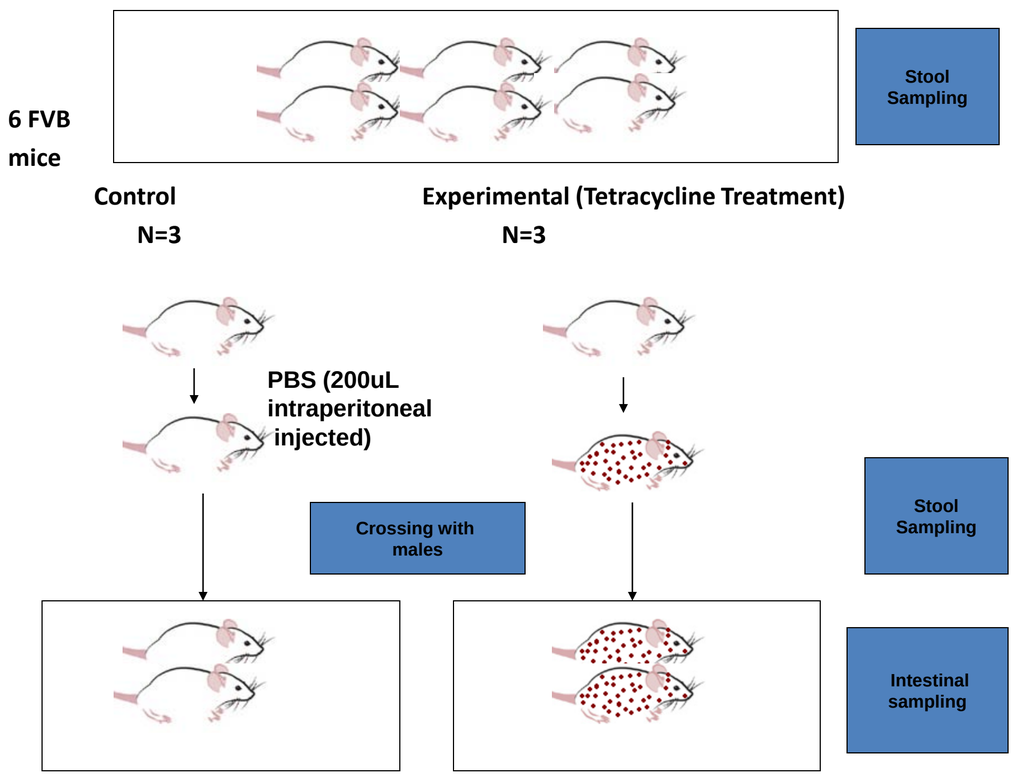

Figure 1. Experimental design

PRELIMINARY RESULTS

•All mothers (treated and controls) showed presence of three resistance genes: *tet*(O), *tet*(Q), *tet*(W). We were unable to amplify *tet*(M). One post-treat mother from the control group amplified for *tet*(S) gene (**Table 1**).

• Concerning the offspring at day 1, all mice amplified for *tet*(O). Only four mice (three control and one experimental) amplified for *tet*(S) (**Table 2**).

•At day 9, all mice amplified for *tet(O)* and *tet*(S) (**Table 2**).

Table 1. Number of mothers with tetracycline resistance genes of ribosomal protection.

Treatment	Animal Group	*tet*(O)	*tet*(Q)	*tet*(W)	*tet*(S)	*tet*(M)
Tetracycline	Mothers pre-treatment (n=3)	3	3	3	To be done	0
	Mothers post-treatment (n=3)	3	3	3	0	0
Control	Mothers pre-treatment (n=3)	3	3	3	To be done	0
	Mothers post-treatment (n=3)	3	3	3	1	0

Table 2. Number of offspring with tetracycline resistance genes of ribosomal protection.

Mice descendants of mothers	Age (days)	*tet*(O)	*tet*(Q)	*tet*(W)	*tet*(S)	*tet*(M)
Treated (N=3)	1	3	0	0	1	0
	9	3	0	0	3	0
Controls (N=3)	1	3	0	0	3	0
	9	3	0	0	3	0

CONCLUSIONS

•Mice show intrinsic resistance to tetracycline.

•There is vertical transfer of tetracycline resistance genes from mother to offspring at early stages in life, without the selective pressure of antibiotics.

REFERENCES

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