

Octopaminergic modulation of distance and force production during Jumping in wild type and mutant *Drosophila melanogaster*

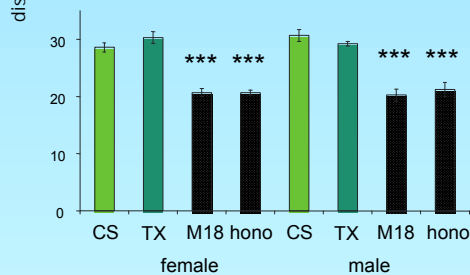
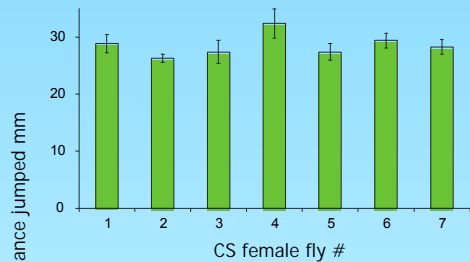
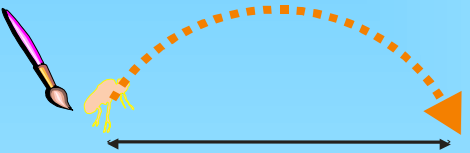


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Introduction: The aim is to measure the distance jumped and muscle force produced by *Drosophila*, and to compare the wild-type with two octopaminergic mutants:

- M18 synthesizes no octopamine
- hono has no tyr/oct receptors

Behaviour

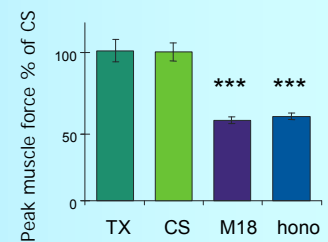
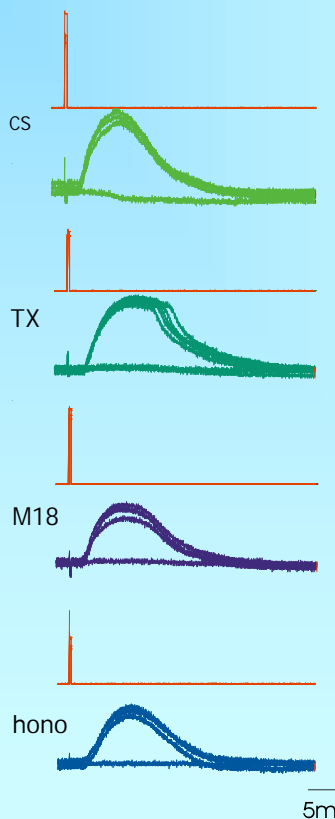
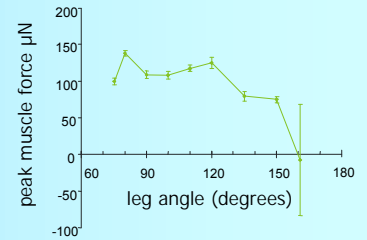
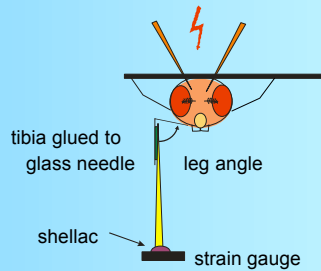


Mutants ...

Jump 2/3 of wild-type distance ⇒
2/3 of wild-type force
Actually produce 53% of wild-type force

Reduction in *hono* suggests this receptor has a role at neuromuscular junction
If *hono* is a pure tyramine receptor, we would not expect a reduction in the *hono* flies

Physiology



Facts ...

mass 1.1 mg
Length of femur+tibia+tarsus 1.36 mm

Take off after 4.9 ms
Speed 0.6-0.7 m/s

Peak force measured as 101 µN at 8.2 ms
88% of peak force at 5 ms

... and our Figures

Calculated KE at take off 200 nJ
Calculated Take off with velocity 0.6 m/s
Power 40 µW = 1.5 W/kg

Calculated force 137 µN at take off
Calculated take-off time 5 ms

Conclusions

Jumping

- ➡ does not require great energy storage
- ➡ enhanced by octopamine
- ➡ *hono* likely to be a dual tyr/oct receptor

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