The Role of Decapentaplegic and TGF-β Signaling in Wound Healing of Vanessa cardui
Jessica Pillard & Dr. Ramos
Department of Natural Sciences - Cytotechnology tract

BACKGROUND

- Decapentaplegic (Dpp) is a morphogen of the TGF-β signaling family that is responsible for the development of the wing imaginal disc in Drosophila.
- Wounding pupae at 18 hours after pupation caused formation of ectopic eyespot that expressed the same transcription factors of normal eyespots; indicating eyespot formation co-opted with wound healing.
- SB431542 is a drug that inhibits the Dpp signaling pathway by blocking the Smad mediated-signaling transduction.
- Purpose of study: To determine the role of TGF-β signaling and Dpp in Vanessa cardui wound healing.
- Hypothesis: The wings will not heal when treated with SB431542 due to the loss of function of Dpp.

MATERIALS & METHODS

- Trial one: Pupae were wounded using a hot needle. Damage inflicted in M2 or M3 wing cell. Adult butterflies were sacrificed.
- Trial two: Same procedure as trial one, except a room-temperature hollow needle was used to inflict damage.
- Analysis: treated wings were examined under Leica microsystems dissecting microscope and pictures were obtained. The images were randomized and scored based on healing (1= healed, 2=unhealed), presence or absence of ectopic eyespot (1= ectopic eyespot, 2= no extra eyespot), and pattern change (1= wild type, 2= loss of pattern element, 3= scale color change). Statistical difference was determined by chi squared (IBM SPSS statistics, version 23).

RESULTS

- Figure 3: The percentage of wings that had an ectopic eyespot on the dorsal and ventral surface in the wounded and control groups.
- Figure 6: The affect of the two different wounding techniques (hot or room temperature needle) on healing of the wing.
- Figure 7: The percentage of wings that were wild type, lost a pattern element, or had a color change after wounding.

CONCLUSIONS

- Wounding repressed the formation of the ectopic eyespot that was commonly found in wild type Vanessa cardui.
- It is possible that the wound itself or the healing of the wound prevented the formation of ectopic eyespot.
- It was not shown that Dpp inhibition prevents healing in the wings.
- Inflicting damage with a hot needle or a room-temperature hollow needle inflicted the same amount of damage.
- Pattern changes most likely seen due to disrupting the wing development, and could be influenced depending on where damage was inflicted.