Novel insights into biodegradation, interaction, internalization, and impacts of high-aspect-ratio TiO_2 nanomaterials: A systematic *in vivo* study using *Drosophila melanogaster*

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The elongated nature of the high-aspect-ratio nanomaterials (NMs) can help us to obtain valuable information on its biodegradation, physical interaction with target-cells, and internalization. Three different length nano-titanium has been studied using *Drosophila*, TEM, and different biological markers. Nano-titanium regardless of their shape was eroded and degraded just entering the gut lumen of the larvae.
Results showed that the distinguished shape of nanowires helps to understand the interactions of NMs with the intestinal barrier. The peritrophic membrane, as the first defense line of the intestinal barrier, succeeded in the reservation of NMs, though the perpendicular particles of nanowires stabbing it, making pores, permitting their translocation into intestinal cells. On the other side, the exposure to TiO_2NPs did not decrease egg-to-adult viability, but all its different shapes, especially nanowires, mediated a wide molecular response including changes of expression in genes involved in stress, antioxidant, repair, and physical interaction responses. All these changes concerning their ability to elevating ROS level ultimately led to potential genotoxicity.
So, the high aspect ratio NMs are efficient in understanding the outstanding issues of NMs exposure, but at the same time could induce genotoxic impact rather than the low aspect ones.