An Emerging Translational Model for Nephrolithiasis Research

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Several animal species are used to study calcium oxalate urolithiasis; however, an ideal model has yet to be identified. We used *Drosophila* as a model organism and fed the flies lithogenic agents such as ethylene glycol, hydroxyl-L-proline, and sodium oxalate. At different times, the Malpighian tubules, the kidney equivalent of insects, were dissected and a polarized light microscope used to highlight the birefringent crystals. Scanning electron microscopy and energy-dispersive X-ray spectroscopy confirmed that the crystal composition was predominately calcium oxalate. Furthermore, administration of potassium citrate successfully reduced the quantity of and modulated the integrity of the ethylene glycol-induced crystals. Thus, the *Drosophila* model of bio-mineralization produces crystals in the urinary system through many lithogenic agents, permits observation of crystal formation, and is amenable to genetic manipulation. This model may mimic the etiology and clinical manifestations of calcium oxalate stone formation and aid in identification of the genetic basis of this disease. Recently, melamine-tainted food can induce renal stones in both humans and animals. We also found that administration of melamine alone caused crystal formation in a dose-dependent manner. The crystals also appeared after ingestion of melamine for 3 weeks in the Malpighian tubules of *Drosophila*. The simple but elegant *Drosophila* is emerging as a powerful translational model of human disease, including nephrolithiasis and may provide important information essential to our understanding of stone formation. The ability to readily manipulate and quantify stone formation in *Drosophila* models of human nephrolithiasis presents the urologic community with a unique opportunity to increase our understanding of this enigmatic disease.