



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

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Project Title Detection of Decreased Renal Expression of Organic Anion Transporter-2 in Aging Mice	
Abstract Objectives/Goals Organic anion transporters (OATs), transmembrane proteins found in the kidney, are important in the excretion of many commonly used drugs and environmental toxins, and it has been hypothesized that decreased drug excretion in older individuals might in part be due to decreased expression of OATs. In this study I assayed the expression of four members of the organic anion transporter (OAT) family: NKT/OAT1 (novel kidney transporter), ROCT/OAT3 (reduced in osteosclerosis transporter), RST (renal specific transporter), and NLT/OAT2 (novel liver transporter) in renal tissue of geriatric and juvenile mice. Further, I investigated the evolution of OATs and OCTs (organic cation transporters) through searches of genome sequence databases and generated dendrograms ("family trees"). Methods/Materials Normal PCR procedures, in non-saturated conditions, were followed to test the expression of the genes being tested. Renal cells were harvested from three distinct juvenile (11 week) BALB/cJ mice and three separate geriatric (44 week) mice of the same strain. To investigate the evolution of the organic ion transporter family, genome sequence databases were searched, using the BLAST search engine (available at http://www.ncbi.nlm.nih.gov/BLAST). Using known sequences as queries, the genomes of two organisms, D. Melanogaster (fruit fly) and C. Elegans (worm), were searched for putative transporters. With the isolated sequences, a dendrogram of the entire evolution of the organic transporter family was created. Results All four known mouse members of the OAT family (NKT/OAT1, NLT/OAT2, ROCT/OAT3 and RST) were tested. Of these, only OAT2 showed reduced expression in aged mice, while the expression of the other three genes remained unchanged. Conclusions/Discussion Adverse drug reactions (ADRs) are common in the elderly, in part because of reduced renal function. Specific proteins, called organic ion transporters are responsible for the transportation of drugs and waste in various organs. If the expression of a transporter is reduced by age, as we have found for OAT2, it only makes sense that renal function will itself diminish. Moreover, since each transporter is specific for a drug, if a transporter's expression is reduced, the ability to handle that drug will also be reduced. In the future, one might be able to test patients for transporter expression and by avoiding specific drugs, it may be possible to decrease ADRs.	
Summary Statement My project tests the expression of members of the organic anion transporter family, transmembrane proteins expressed in excretory organs that are responsible for the excretion of drugs and environmental toxins.	
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