

# GENOTOXIC RESPONSE OF UNIONID MUSSEL HEMOLYMPH TO HYDROGEN PEROXIDE AND POLYCYCLIC AROMATIC HYDROCARBONS

**Sharon T. Prochazka & W. Gregory Cope\***

Department of Environmental and Molecular Toxicology  
Campus Box 7633, North Carolina State University, Raleigh, North Carolina, 27695 U.S.A.

**Leslie Recio**

Integrated Laboratory Systems, Inc.  
PO Box 13501, Research Triangle Park, North Carolina, 27709 U.S.A.

\*Corresponding author: Tel: 919-515-5296; email: greg\_cope@ncsu.edu

## ABSTRACT

The single cell gel electrophoresis or comet assay is widely used to detect DNA damage in isolated cells following exposure to genotoxic compounds. This assay, although commonly used with marine bivalve tissue and circulatory fluid, has received little use or demonstration in freshwater mussels of the order Unionida. Because such a large proportion (>70%) of this faunal group is globally imperiled and is being adversely impacted by environmental contaminants, including many genotoxicants, the aim of this study was to assess the applicability of the comet assay in unionid mussel hemolymph sampled non-lethally with a reference genotoxicant, hydrogen peroxide ( $H_2O_2$ ) and polycyclic aromatic hydrocarbons (PAHs), a class of common environmental pollutants of genotoxic action. DNA damage was evaluated in samples of hemolymph from *Elliptio complanata* in both *in vitro* and *in vivo* exposures and quantified using the endpoints % tail DNA, or the percentage of DNA in the comet tail and OTM or olive tail moment, the product of the fraction of DNA in the tail and tail length. Hemocytes were isolated and the comet assay was performed on control, 160  $\mu M$   $H_2O_2$ , and PAH treated cells. From the *in vitro* exposures, 160  $\mu M$   $H_2O_2$ , as well as the 50 and 100  $\mu g/L$  total PAH treatments yielded statistically significant ( $p < 0.05$ ) levels of DNA damage, with the  $H_2O_2$  yielding an average of 39.7 % tail DNA and 13.3 OTM and the two PAH treatments yielding 40.7 % and 38.6 % tail DNA, and 12.4 and 11.0 OTM, respectively. An *in vivo* PAH exposure with adult *E. complanata* did not detect a similar genotoxic response to that detected with *in vitro* exposure, indicating that additional research and evaluation may be necessary before implementing the widespread use of a non-lethal, unionid mussel hemolymph based genotoxicity screening tool for environmental biomonitoring.

**KEY WORDS** Comet Assay, Freshwater Mussel, Unionid, Genotoxic, Hemolymph, PAH