

Toxicological Analyses of Cadaver Tissue and Scavenger Diptera Larvae to Determine the Cause of Death, in a Rat Phenobarbital Suicide Model

Vasilios Stoukas¹, Konstantinos Prousalis², Fotini Skeparni³, Ioannis Anastasiou⁴, Ioannis K. Zarkadis¹, Eleftheria Giannopoulou¹, Athanasia Mouzaki¹

¹Medical School, ²Dpt. of Chemistry, ^{1,2}University of Patras; ³Laboratory of Toxicology and Pharmacokinetics, St. Andrew General Hospital of Patras; ⁴Dpt. of Biology, University of Athens, Greece

AIM

In Greece, forensic determination of substances in cadavers found in open space and also forensic entomology, are at their infancy. To tackle this issue, we created a model of rats killed with the barbiturate phenobarbital and left in the open, to determine the presence and concentrations of the substance in various tissues, as well as identify the scavenger insects found on the cadavers.

MATERIALS AND METHODS

Thirty wistar rats were used in a total of six experiments. Half of the rats were sacrificed by abdominal infusion of 300 mg of phenobarbital dissolved in distilled water, and half by neck dislocation (controls). The rats were then exposed in open air nude for 0, 4, 5, 6, 7 and 8 days. At the times indicated, the bodies were collected, and liver, kidneys, lungs, heart, blood and fly larvae were taken away for further analyses. For the toxicological analyses of the specimens, a Cobas Integra 400 (Roche Diagnostics) was used. This automatic analyzer performs measurements for the quantitative determination of drug concentrations using fluorescence polarization. In addition, scavenger insects were collected from the experiment scene. These insects were preserved in Kahle's solution, and then were grouped. In addition, analytical climatological data were recorded, i.e. temperature (T, °C), relative humidity (RH, %) and rainfall level (r, mm), in an hour basis.

RESULTS AND DISCUSSION

The climatological data of the study area (South-western Greece) during the time of the project (October-November 2005) were: T=18.6°C (Oct.) and 14.3°C (Nov.), RH =60.4% (Oct.) and 64.4% (Nov.), and r=2.16mm daily (Oct.) and 5.52mm daily (Nov.). The insects collected belong to the orders of diptera, coleoptera and hymenoptera. The dominant order was diptera, family Calliphoridae, species Calliphora Vicina. Up to now, we have completed the toxicological analysis in blood. The results (summarized in the table) indicate that there is a time dependent linear increase in the levels of phenobarbital in the bloody fluid therefore, it is concluded that the decay plays an important role in the barbiturates related deaths. Presently we are analyzing the rest of the collected tissues for the presence and the concentration of phenobarbital.

Table

Specimen*	C (Concentration)
00 PH	656,5 µg/ml
01 PH	1666,5 µg/ml
02 PH	2161,4 µg/ml
05 PH	2595,7 µg/ml

*00 → zero days of exposure

01 → four days of exposure

02 → five days of exposure

05 → eight days of exposure

PH → death occurred with phenobarbital injection
For the experiments 03 PH and 04 PH no blood was found, due to decomposition