

Vinson, J.A., 1981.

SELENIUM TOXICITY STUDY

Background

The toxicity of a substance or a chemical compound can be determined in many ways including chronic and acute exposure. The most common method is the lethal dose 50 (LD50) which is defined by the "Registry of Toxic Effects of chemical substances" published by the US Public Health Service (1978 edition) as a "calculated dose which is expected to cause death of 50% of a defined animal population. It is calculated by giving different doses to the experimental animals and observing the number of deaths in a given period of time after administration". The most common procedure is an acute dosage and the measurement of % mortality after a short period of time. The lower the value of LD50 the more toxic is the substance.

The rat is the most common animal model for an LD50 study because rats can be bred to be genetically similar and rats are easy to maintain in large numbers.

Protocol

Male weanling rats were divided into groups of 10 and weighed before each experiment. The average weight was used in the calculations. Sodium Selenite, Na_2SeO_3 in which selenium (Se) is in the +4 oxidation state was compared to Selenium yeast in which Selenium is in the -2 oxidation state.

The Sodium Selenite was dissolved in water and given orally to each rat by pipette. The yeast was suspended in water and the mixture given by pipette. The rats were observed for 2 weeks after dosing and the number of deaths noted. LD50 is calculated from a probit plot. The results are shown below:

Form of Se	Selenium dose (micrograms)	Selenium dose (milligrams/kg)	% Deaths
Sodium Selenite	80	1.60	20
Sodium Selenite	320	6.40	30
Sodium Selenite	640	12.8	50
Yeast	640	10.67	0
Yeast	3200	47.10	40
Yeast	6400	94.12	100

Sodium Selenite Calculated LD50	12.7 mg/kg
Selenium Yeast Calculated LD50	37.3 mg/kg

Therefore the Sodium Selenite is 2.94 times more toxic than the Selenium Yeast.