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NOXIOUS GASES THREAT AMINO ACIDS IN *FUNAMBULUS PENNANTI*

R.K. GAUTAM AND VINEETA CHAUDHARY
DEPARTMENT OF ZOOLOGY, ST. JOHN'S COLLEGE, AGRA - 282002, INDIA.

Carbon monoxide (CO) and Sulphur dioxide (SO_2) are the main noxious gases present in our environment. Present histochemical observations made on amino acids in the testes and ovaries of common ground squirrel *(Funambulus pennanti)* reveal an overall depletion in the tyrosine and tryptophane after CO and SO_2 exposures. These noxious gases interact with cellular proteins in specific manner.

INTRODUCTION

There is abundant evidence that exposure to air pollution can increase the severity, sometimes fatally, of chronic respiratory diseases (Royal College of Physicians, 1970). Clinical manifestations of increased resistance to pulmonary air flow are commonly noted when exposure is too high concentration of pollutants. High photochemical oxidant concentrations have been reported in Canada and in Europe (Edmonton Air Pollution Survey, 1971; Atkins *et al.,* 1972) and can probably occur in most areas where there is high concentration of automobile traffic and fossil fuel burning industries. There is limited scientific information on health effects of pollutants. Carbon monoxide and Sulphur dioxide are the chief air pollutants present in the urban areas where they show their ill effects on health. Chronic exposure to these air pollutants has been shown to produce lung damage and alter pulmonary functions in several animal species, (House, 1964; Bushtueva, 1957; Prokhorov, 1959). So far no significant attempt has been made to study the effects of these pollutants on the reproductive organs. Present histochemical investigation incorporates the fate of amino acids, tyrosine and tryptophane in the testes and ovaries of *Funambulus pennanti* after CO and SO_2 exposures.

MATERIALS AND METHODS

Squirrels are found around human habitations sharing pollution too, with man, hence, these were preferred for the present investigation in comparison to other laboratory mammals. Thirty common ground squirrels with an average starting weight of 100 gms were selected for the present studies.

They were housed in three groups of ten (five male and five female) separately and provided laboratory chow and water *ad libitum*. 1st group was treated as control squirrels. The IInd group was exposed to Carbon - monoxide for 4 minutes at the concentration of 500 ppm (0.05%) in an air tight environmental chamber. Squirrels of the IIIrd group were allowed to inhale Sulphur dioxide in the same fashion and at the same concentration and duration.The treatment was applied to the squirrels for a fortnight on each alternate day. After two weeks the squirrels were sacrificed one by one by decapitation. The tissues - testes and ovaries were removed carefully and fixed in 10% neutral formaline (as a fixative) for 16 hr at room temperature. Paraffin sections were prepared and subjected to the following histochemical tests :

Tyrosine : The Millon's Reaction (Benseley & Gersh, 1933).
Tryptophane : DMAB - Nitrite Method (Adams, 1957).

RESULTS AND DISCUSSION

Tyrosine

Testes : In control testes a strong positive reaction was observed in the serosa, tunica albugenia, germinal epithelium, spermatogonia and connective tissue fibres while other layers gave negative

Table I : Distribution of amino acids in the testes of *F. pennanti* after exposures to CO and SO_2 gases.

Treatment	Serosa	Tunica albugenia	Germinal epithelium	Spermato-gonia	Primary Spermatocyte	Secondary Spermatocyte	Spermatids	Sperms	Sertoli cells	Connective tissue	Interstitial cells
TYROSINE											
Control	++	++	+	+	+	±	±	±	±	+	-
CO	±	±	-	-	-	-	-	-	-	±	-
SO2	±	±	±	±	-	-	-	-	-	±	-
TRYPTOPHANE											
Control	++	+	+	+	-	-	-	-	-	±	-
CO	±	±	±	-	-	-	-	-	-	-	-
SO_2	+	±	±	-	-	-	-	-	-	±	-

Table II : Distribution of amino acid in the ovary of *F. pennanti* after exposures to CO and SO_2 gases.

Treatment	Peritoneum	Tunica albugenia	OVARIAN FOLLICLE				Stroma	Interstitial cells
			Membrana granulosa	Discus proligrous	Zona pellucida	Oocyte		
TYROSINE								
Control	++	+	+	+	±	-	-	-
CO	±	±	-	-	-	-	-	-
SO2	+	±	-	-	-	-	-	-
TRYPTOPHANE								
Control	+	+	+	+	±	-	±	-
CO	±	-	-	-	-	-	-	-
SO_2	±	±	±	±	-	-	-	-

++ = Strong activity; + = Moderate activity; ± = Dull activity; - = Nil activity.

response. After So_2 treatment a dull reaction for tyrosine was observed in serosa, tunica albugenia, germinal epithelium, spermatogonia and connective tissue only (Table I).

Ovaries : In control squirrels, a positive reaction for tyrosine was observed in peritoneum, tunica albugenia and ovarian follicles. After CO and SO_2 exposures a dull and feeble reaction was observed in peritoneum and tunica albugenia. The ovarian follicle layers gave no response (Table II).

Tryptophane

Testes : In control testes, the presence of tryptophane was observed in serosa, tunica albugenia, germinal epithelium and spermatogonia only. After CO and SO_2 treatments poor reactions were observed in serosa, tunica albugenia and germinal epithelium. The intensity of reaction was somewhat better in SO_2 treated testes than CO (Table I).

Ovaries : A positive reaction for tryptophane was seen in control ovaries in the peritoneum, tunica albugenia and ovarian follicles. CO affected more, the presence of tryptophane in tunica albugenia and ovarian follicles while SO_2 exhibited a mild and poor reaction in peritoneum, tunica albugenia and ovarian follicles (Table II).

The above findings clearly indicate that CO and SO_2 gases have adverse effects on the amino acids present in the testes and ovaries of *F. pennanti*. In the present study made on amino acids, due to lack of available literature, as such, no comparison could be made. A dull and poor reaction for tyrosine and trytophane was observed in tissue layers of both testes and ovaries after exposure to each gas. Probably, changes in protein contents are brought about by altered membrane permeability (Buell *et al.*, 1965; Thomas & Rhoades, 1970). These findings are important from toxicological point of view. Our present histochemical observations made on amino acids will fill up the gap on the adverse effects of air pollutants on reproductive organs of *F. pennanti* and will help to dispel doubts concerning the reliability of air pollutant exposures.

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