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Development of Anemias in Rats after Exposure to Low Oxygen Tensions.

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We have found that adult rats exposed to low oxygen tension, upon return to normal atmospheric conditions, develop a marked anemia, regardless of whether or not the usual polycythemia occurs.

Sixty-six adult and 11 young rats were exposed to air pressures ranging from 650 to about 360 mm. of mercury for periods of from 2 to 14 days. Red cell counts were made in each case before exposure, immediately after exposure, and then every 48 hours. Two drops of blood were used for the counts and excess bleeding was prevented by temporarily ligating the tail.

The surviving rats responded to the treatment as follows: (1) Twenty-one of the adult rats showed an increase in red cells varying from one to 4 million, following the exposure to low air pressure. Then, within 48 hours, there was a drop amounting to about 45% to 80% of the excess erythrocytes. Later, these rats all developed an anemia lasting in some cases longer than a month, with red cell counts as low as 5 million below the normal. (2) Thirteen adult rats, after similar exposure periods, did not show any apparent increase in the number of circulating red cells. But here again an anemia developed, generally setting in earlier than in the rats of Type 1. (3) Seven young rats, 40 to 60 days of age, with blood counts ranging from 5 to 6½ million, showed increases after the exposure of from 1½ to 4 million red cells. These rats did not develop an anemia with respect to the first blood count. They did show a slight drop after the exposure, followed later by a rise.

Cases of anemias following polycythemias have been reported by many clinicians. "Plethoric anemias" following transfusion of large amounts of blood have been noted.¹⁻⁶ In these cases, it has generally been assumed that the cause is an "exhaustion of the bone marrow," a hyperactivity of "blood destroying organs," or an inhibition of the bone marrow by some unknown factors.

¹ Hess, R., *Deutsch. Arch. klin. Med.*, 1909, **95**, 482.

² Itami, S., *Folia haematol.*, 1908, **6**, 425.

³ Robertson, O. H., *J. Exp. Med.*, 1917, **26**, 221.

⁴ Ottenberg, R., and Thalheimer, W., *J. Med. Research*, 1915, **33**, 213.

⁵ Krumbhaar, E. B., and Chanutin, A., *J. Exp. Med.*, 1922, **35**, 847.

⁶ Kambe, H., and Komiya, E., *Am. J. Physiol.*, 1920, **51**, 1.

It is probable that following the exposure, the tissue oxygen tensions are altered to a higher level than the normal. This increase in the tissue tensions may be partly responsible for the anemia.

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Comparative Chronic Toxicities of Fluorine Compounds.*

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The minimal dose capable of producing chronic intoxication in the albino rat has been determined for sodium fluoride, sodium fluosilicate, barium fluosilicate, and sodium aluminum fluoride (natural cryolite). Male rats ranging in weight from 30 to 60 gm. were placed on a basic diet consisting of corn meal 73 gm., linseed oil cake meal 10 gm., alfalfa 2 gm., casein 10 gm., codliver oil 3 gm., bone ash 1½ gm., sodium chloride ½ gm. For each compound studied 6 control rats were placed on this diet, and for each dosage level 6 rats were placed on the same diet to which a weighed amount of the fluorine compound had been added and evenly distributed by means of a mechanical mixer. Analyses showed even distribution of the toxic agent throughout the basic diet. For each compound a series of dosage levels was employed, each dose being one-half the preceding dose.

The criterion of toxic action was bleaching of the upper and lower, especially the lower, incisor teeth. Table I summarizes the data. In the case of each compound, the dosage level indicated means that bleaching was present in all of the rats on that dosage, but absent when one-half of that dose was administered.

When the fluorine content of the molecule is taken into consider-

TABLE I.

Compound	Solubility per 100 parts water	% in diet	Parts of Fluorine per million parts food
Sodium Fluoride	4.000	0.0025	12
Sodium Fluosilicate	0.650	0.0025	15
Barium Fluosilicate	0.026	0.0050	13.7
Sodium Aluminum Fluoride	0.060	0.0050	24.3

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