eosinophilia is a phenomenon which occurs after formation of antigen-antibody complexes. Whether immune complexes are capable of eliciting further antibody production once they have been phagocytosed by cells remains a matter of speculation. The presence of eosinophils may merely reflect their specific attraction by immune complexes and does not necessarily indicate that they are implicated in production of antibody or in mediation of the hypersensitive state.

*Summary.* Peritoneal exudates were produced in guinea pigs by intraperitoneal injection of ferritin in previously immunized animals. The centrifuged cells of the exudate examined with the electron microscope were found to contain 10-15% eosinophils. Ferritin-antibody complexes, characteristic of *in vitro* immune complexes were observed within the cytoplasm of eosinophils and other granulocytes. This observation indicates that eosinophilia is mediated by immune complexes and provides evidence that at least one function of the eosinophil is the phagocytosis of antigen-antibody complexes. Our results showed no evidence that eosinophils are implicated in the formation of antibody.

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## Effect of Food Fats on Concentration of Ketone Bodies and Citric Acid Level in Blood and Tissues.* (28135)

D. M. BRAHMANKAR AND M. C. NATH
*Department of Biochemistry, Nagpur University, Nagpur, India*

Blood ketone concentration in fasting or diabetic animals rises because of the stimulation of fat breakdown. Deuel *et al.*(1) observed increased ketonuria in human subjects maintained on high fat-high protein diet. Roberts and Samuels(2,3) reported higher blood ketones and enhanced ketone body excretion in fat diet adapted rats as compared to carbohydrate fed rats. Tepperman and Tepperman(4) also noticed similar ketonemia in fat fed rats in the fed state.

Recently it has been shown that high fat (groundnut oil) feeding increases acetoacetate production by liver slices and utilization by kidney slices, but the utilization falls considerably on prolonged feeding of same high fat diet for 12 weeks(5).

This report concerns a study of the comparative effect of prolonged feeding of different kinds of food fat on concentration of ketone bodies in plasma and tissues.

*Materials and methods.* Forty-eight male albino rats averaging 125 g in body weight were divided into 6 equal groups. Group I was kept on normal (carbohydrate) diet whereas all other 5 groups were given high fat and high casein diet containing different kinds of food fat.

The normal diet consisted of casein 20%, sucrose 50%, wheat flour 16%, groundnut oil 9%, cod liver oil 1%, salt mixture 4% (6). High fat diet included casein 30%, wheat flour 30%, fat 35%, cod liver oil 1%, salt mixture 4%. The water soluble vitamins added per 100 g of the diet were thiamine .4 mg, riboflavin .4 mg, pyridoxine .3 mg, nicotinic acid 3 mg, calcium pantothenate 2 mg, folic acid .2 mg, inositol 30 mg, biotin 1 mg, $B_{12}$ 15 $\mu$g, choline chloride 500 mg.

Groups II, III, IV, V and VI received groundnut oil, sesame oil, butter fat, hydrogenated groundnut oil and coconut oil respectively.

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TABLE I. Ketone Bodies in Plasma and Tissues of Animals Fed Different Fats. mg %.

| | Groups | Plasma | Liver | Kidney | Heart muscle |
|---|---|---|---|---|---|
| I | Normal | .58 ± .13 | .72 ± .09 | .78 ± .08 | .71 ± .12 |
| II | Groundnut oil | 2.79 ± .29 | 3.30 ± .31 | 4.14 ± .28 | 3.80 ± .34 |
| III | Sesame oil | 2.71 ± .41 | 3.10 ± .39 | 4.30 ± .38 | 2.30 ± .26 |
| IV | Butter fat | 6.36 ± .31 | 8.90 ± .38 | 10.40 ± .21 | 4.20 ± .43 |
| V | Hydrogenated groundnut oil | 4.50 ± .34 | 6.24 ± .29 | 6.33 ± .37 | 5.17 ± .28 |
| VI | Coconut oil | 5.10 ± .34 | 7.27 ± .32 | 6.47 ± .24 | 4.90 ± .43 |

± S.E.M.

At the end of the 12-week feeding period ketone bodies in plasma and tissues were estimated according to the method of King and Lester(7). It has been reported from this laboratory that long continued injection of acetoacetate causes such disturbances in carbohydrate metabolism as decreased glucose tolerance and hyperglycemia(8,9). It was, therefore, felt desirable to investigate whether there is any disturbance in Krebs' cycle after feeding high fat to the animals. Hence the level of citric acid, one of the intermediary members of the Krebs' cycle, was studied. Citrate was determined according to the method suggested by Natelson *et al.*(10). All estimations were done in the fed state.

*Results and discussion.* Plasma and tissue ketone concentration was found to be elevated in all the high fat fed animals. The rats fed saturated fat (butter fat, coconut oil and hydrogenated fat) exhibited higher concentration of ketone bodies in plasma and tissues than did those receiving unsaturated fat (groundnut and sesame oils) (Table I). The greatest increase of ketones was in butter fat fed animals as compared to those of other groups.

No significant variation in citric acid level occurred in unsaturated fat fed animals as compared to normal (Table II). Animals fed saturated fat showed some increase in citric acid level of plasma and tissue.

These results indicate that the adaptation of animals to different kinds of fat influences the accumulation of the ketone bodies. The saturated fats cause more accumulation or ketone bodies in plasma, liver, kidney and heart muscle than do unsaturated fats. Butter fat and coconut oil are rich in short chain and long chain saturated fatty acids(11) and poor in polyunsaturated fatty acids whereas groundnut oil and sesame oil are rich in polyunsaturated fatty acid(12). Munoz and Leloir(13,14) showed that fatty acids of shorter carbon chain length are oxidized rapidly. It has been demonstrated that there is rapid loss of saturated fatty acids during fasting in rats previously kept on a coconut oil diet(15,16). Therefore, it is evident that butter fat and coconut oil may be oxidized more rapidly than sesame and groundnut oils, thus producing more ketone bodies. Moreover, the utilization of ketone bodies decreases considerably on prolonged feeding of fat(5). Thus increased production of ketone bodies coupled with their diminished utilization by extrahepatic tissues may cause greater accumulation of ketone bodies in the plasma and tissues of the saturated fat fed animals than in those receiving unsaturated fat in diet.

The altered concentration of citric acid in plasma and tissues may reflect the activity

TABLE II. Citric Acid Level in Plasma and Tissue of Animals Fed Different Fats. mg %.

| | Groups | Plasma | Liver | Kidney | Heart muscle |
|---|---|---|---|---|---|
| I | Normal | 2.80 ± .53 | 3.23 ± .48 | 3.12 ± .38 | 4.02 ± .34 |
| II | Groundnut oil | 2.82 ± .48 | 3.28 ± .37 | 3.98 ± .49 | 4.38 ± .56 |
| III | Sesame oil | 2.91 ± .33 | 3.24 ± .46 | 3.63 ± .58 | 4.08 ± .32 |
| IV | Butter fat | 3.40 ± .41 | 3.82 ± .39 | 4.93 ± .32 | 5.13 ± .44 |
| V | Hydrogenated groundnut oil | 3.20 ± .29 | 3.61 ± .34 | 4.23 ± .28 | 5.23 ± .31 |
| VI | Coconut oil | 3.12 ± .37 | 3.92 ± .29 | 4.62 ± .32 | 5.56 ± .29 |

± S.E.M.

of the Krebs' cycle. The increased level of citric acid in plasma and tissues of saturated fat fed animals may indicate either enhanced formation of citric acid in the tissues, or diminished utilization through Krebs' cycle as compared to that of unsaturated fat administered animals. The increased accumulation of ketone bodies in saturated fat fed animals may be caused by their diminished oxidation through Krebs' cycle.

*Summary.* Although the concentration of ketone bodies was found to be elevated in all fat fed animals, the saturated fat (butter fat, coconut oil and hydrogenated groundnut oil) adapted rats showed more accumulation of ketone bodies in plasma, liver, kidney and heart muscle than did those receiving unsaturated fats (groundnut oil and sesame oil). The citric acid level was also elevated in saturated fat fed rats whereas no such variation was observed in animals receiving unsaturated fat in the diet.

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## Observations on the Course of Coxsackie A-9 Myocarditis in C3H Mice.* (28136)

ERNEST E. FEDERICI,† A. MARTIN LERNER‡ AND WALTER H. ABELMANN
(Introduced by Maxwell Finland)
*Thorndike Memorial Laboratory and Second and Fourth (Harvard) Medical Services, Boston City Hospital, and Department of Medicine, Harvard Medical School, Boston, Mass.*

Acute myocarditis due to the Coxsackie viruses has been shown to occur in man in all age groups(1-3) and has been produced experimentally in suckling hamsters and, occasionally, in the adult mouse(4,5). As part of a general investigation of experimental myocarditis in the mouse, we have studied some effects of Coxsackie A-9 virus (strain 13) on adult mice.

*Materials and methods.* Male C3H mice,§ 8-9 months of age, weighing 28 to 40 g were chosen as experimental animals. Only mature mice were used because previous observations with the virus used in this study have demonstrated histologically evident myocardial lesions only in older mice(5). Female mice were excluded because of the effect of estrus on activity(6). The animals were housed 6

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† Research Fellow, Massachusetts Heart Assn.

‡ Research Fellow of Medical Foundation, Inc. Present address: Dept. of Biology, Massachusetts Inst. of Technology, Cambridge.

§ Jackson Memorial Laboratory, Bar Harbor, Maine.