individual, i.e., 2 h after the meal; in the later samples the intensity of that band then decreases progressively with time following eating such that it has or has nearly returned to base line level in sample No. 5. 2. There are differences in the apoprotein bands in the region between pH 6.5 and 7.5 between the pre- and post eating samples. More intensely staining bands occur in samples 2 and 3 than in 1 and 5. These differences are not as clear as those in (1). They may, none the less, be similarly significant. No attempt was made in this experiment to quantitate the staining intensity of the bands or to further identify the apoproteins which give rise to these bands.

Discussion. We believe that the finding that only a small number of VLDL apoproteins increases significantly following food intake and that the concentrations of the majority of the apoproteins remains unaffected is interesting and significant. Qualitative as the present findings are, they are quite adequate to exclude what might appear to be the most plausible assumption about apoprotein function in lipid transport, namely that in response to food intake, simply more of the same VLDL is produced as that which is circulating in the fasting state. Newly formed VLDL following food intake obviously has a different apoprotein composition than VLDL present in the fasting state.

Some of the questions which arise are: What is the origin of these new apoprotein? Are they newly synthesized proteins, perhaps synthesized in the gut, or are they some of the minor high density apoproteins? What kinds of lipoprotein molecules carry these apoproteins? Are these apoproteins carried as special subpopulations[14,16,17]? Are each of the apoproteins or subpopulations under independent metabolic control or is the control of certain of them linked? These questions will remain open until the apoproteins and subpopulations are isolated and characterized so that quantitative metabolic studies can be carried out.

Summary. The concentrations of certain of the very low density human serum lipoprotein apoproteins were found to increase following a meal, while the concentrations of the majority of the apoproteins were found to be unaffected.

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Effect of Sex Hormones on Uric Acid Metabolism in Rats

It has been known for many years that the average serum urate concentration of pre-menopausal females is approximately 1.0 mg per 100 ml lower than that of males[1]. The existence of this sex difference in serum urate concentration has been attributed to the hormonal alteration found between both sexes. The purpose of this study is to evaluate the effect of some sex hormones on urate metabolism in animal experiments.

Methods and materials. Wistar rats weighing 150–200 g were used in the present study. Plasma and urinary uric acid concentration were estimated, using an enzymic spectrophotometric method of LIDDLE[2]. Allantoin was measured by the method of LARSON[3]. Blood samples were taken before and after the completion of the daily administration of sex hormones. 24-hour urine samples were collected in every group during successive 7 days before and after the administration of hormones. Estrogen or progesterone were administered to female rats and androgen to male rats. The daily doses of estrogen, progesterone and androgen i.m. were 10 mg, 100 mg and 100 mg/kg body weight, respectively. These hormones were daily administered for 7 days. Blood samples were analyzed for concentration of uric acid. Urinary excretion of uric acid and allantoin were measured and calculated in 24-hour urine samples.

Results. The results of the present study are summarized in the Table. When 100 mg/kg body weight estrogen was given daily for 7 days in female rats, the mean plasma urate level (1.85 $\pm$ 0.76 mg/100 ml) and the mean excretion of uric acid plus allantoin (72.89 $\pm$ 11.54 mg/day) did not change (1.87 $\pm$ 0.93 mg/100 ml, 75.17 $\pm$ 11.72 mg/day).

On injection of androgen, 10 mg/kg body weight in male rats, the mean plasma urate level was slightly elevated from 2.10 $\pm$ 0.81 mg/100 ml to 2.24 $\pm$ 0.84 mg/100 ml and the mean urinary excretion of uric acid plus allantoin was slightly increased from 73.73 $\pm$ 14.33 mg/day to 78.02 $\pm$ 14.65 mg/day. But these differences were not significant.

The mean plasma urate concentration was significantly reduced from 2.43 $\pm$ 1.04 mg/100 ml to 1.53 $\pm$ 0.57 mg/100 ml and the mean urinary excretion of uric acid plus allantoin decreased from 60.15 $\pm$ 19.81 mg/day to 54.71 $\pm$ 16.56 mg/day by the injection of progesterone 100 mg/kg body weight in female rats.

Discussion. It is well recognized that plasma urate levels reflect both de novo purine synthesis and renal excretion of uric acid. It is also generally accepted that plasma urate levels in children do not differ between both sexes[1]. In pre-menopausal adult women, plasma urate levels are about 1.0 mg/100 ml lower than those of men, and they are gradually increased in menopause. This age and sex difference in urate metabolism suggests endocrine alterations in men.

MIKKELSEN et al.[1] showed in population studies in Tecumseh that the plasma urate levels in pregnant women were significantly lower than those of age-matched non-pregnant women. From these findings they suggested that estrogen and/or progesterone may have urate-depressing ability. Similar observations were reported by BOYLE et al.[4]. They studied the influence of pregnancy on urate metabolism and confirmed that the serum urate levels are significantly lower during early and middle pregnancy than those of age-matched female controls. They showed that the urate excretion was increased in middle and late pregnancy. They consider

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The influence of the i.m. administration of sex hormones in rats on plasma urate levels and urinary excretion of uric acid and allantoin

Hormones	No. of animals	Plasma urate level (mg/100 ml)		Urinary excretion Uric acid (mg/day)	Allantoin (mg/day)
Androgen (10 mg/kg/day)	16	before	2.10 ± 0.81	1.73 ± 1.93	72.6 ± 12.4
		after	2.24 ± 0.84	1.82 ± 0.55	75.2 ± 14.1
Progesterone (100 mg/kg/day)	13	before	2.43 ± 1.04	1.25 ± 0.21	58.9 ± 19.6
		after	1.53 ± 0.57[a]	1.21 ± 0.26	53.5 ± 16.3
Estrogen (100 mg/kg/day)	13	before	1.85 ± 0.76	1.99 ± 0.24	70.9 ± 11.3
		after	1.87 ± 0.93	1.97 ± 0.61	73.2 ± 11.1

[a] $p < 0.05$. Plasma urate levels were average values ± SD of animals. Urinary excretion were shown by average values ± SD of succession 7 days.

that the renal clearance of urate is increased in pregnancy and the enhanced renal excretion of uric acid and/or hypervolaemia of pregnancy may result in the hypouricemia. However, in early pregnancy they could not show any change in renal excretion of uric acid. Recently NICHOLLS et al.[5] examined the effect of estrogen on plasma and urinary uric acid in trans-sexual men, and showed that stilboestrol increases the renal excretion of uric acid and lowers the plasma urate level. They suggested that uricosuric action of stilboestrol is a possible cause for age and sex differences in plasma uric acid.

In rats, the endproduct of purine metabolism is allantoin and is excreted in urine in large amounts though urinary excretion of uric acid is very little. Therefore, it is difficult to estimate the renal clearance of uric acid exactly.

The present study seemed to indicate that estrogen has no influence on urate production and on the renal clearance of uric acid. However, it cannot be denied that estrogen may influence uric acid excretion. We demonstrated that plasma urate concentration and urinary excretion of uric acid plus allantoin was reduced by progesterone, and therefore it could be assumed that progesterone diminishes purine synthesis and this effect of progesterone would appear to explain the sex difference in urate levels in adults.

ACHESON[6] showed previously a significant positive correlation between serum uric acid and haemoglobin levels in healthy adults and suggested that the sex difference in urate metabolism may be related to the difference in turn-over rate of blood cells in both sexes. MIKKELSEN et al. found that in male subjects the plasma urate levels showed a marked rise at the puberty and speculated that androgen may play an important role in raising the plasma urate levels. However, we could not confirm this hypothesis in the present study, and further experiments will have to be carried out to clarify the effect of androgen on purine metabolism.

Summary. The effects of sex hormones on purine metabolism were investigated in rats. No influence on purine synthesis was shown by the injection of estrogen and androgen. The plasma urate levels were significantly lowered from 2.43 ± 1.04 mg/100 ml to 1.53 ± 0.57 mg/100 ml by the injection of progesterone. Urinary excretion of uric acid plus allantoin was slightly reduced. These results suggested that progesterone may influence age and sex differences in human plasma urate levels.

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The Effect of Hunger on Free Fatty Acid and Corticosterone Plasma Levels in Rats

Fatty acids provide an energy source capable of rapid mobilization for nearly all of an organism tissues. They are stored in the adipose tissue as triglycerides and are set free by lipolysis. When the organism requires more energy than is available from its diet, or from liver or muscle glycogen, mobilization of fatty acids is increased[1,2]. The hormones of the pituitary gland and the adrenal cortex play an important role in the mobilization of fat in fasting animals[1,3-5].

This investigation deals with the changes with time in the plasma concentrations of free fatty acids (FFA) and corticosterone in the case of fasting rats in comparison with normally fed controls. The diurnal cycles of the animals were taken into consideration. Also, the effect of hypoxia on the concentration changes of the FFA was investigated.

Material and methods. Male Wistar rats (160–200 g) were fed a standard diet (Rat biscuit from the Tagger Co., Graz) for 4 weeks before the start of testing. The feed contained 59.5% carbohydrates, 21.7% protein, 2.6% fats, and was enriched with vitamins and minerals. In all tests, water was available to the animals ad libitum. The same animals were used for all experiments. Once a

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