

FREE AMINO ACIDS CONTENT OF ENDOMETRIUM IN STERILE WOMEN

by

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Introduction

The structural changes of the uterine endometrium during the menstrual cycle are clear and easily recognised but considerable disorder of function may be associated with little or no deviation from the normal histological pattern. For instance, in cases of sterility, habitual abortion, dysmenorrhoea and functional uterine bleeding the endometrium commonly shows no structural abnormality and this has hindered the investigation and management of these important disorders. During the past several years increased attention has been focussed on functional requirements and physiological activities of the normal endometrium. The metabolic activity of the endometrium depends upon the amount of glucose delivered to the tissues and also the availability of the enzymes to carry out the reaction. The endometrium metabolises carbohydrates, lipids and proteins, not only for nutrition of the implanting fertilized ovum and its rapid proliferation, but also to produce a

high rate of energy for the dynamic growth of the tissue. Since the free aminoacids are the building blocks for most of the complex proteins their concentrations might be of assistance in understanding certain important physiologic phenomena in cases of human sterility. Therefore, the present investigation is sought to augment our knowledge of human endometrial metabolism during sterility, which might be useful in appraising human reproductive performance.

Material and Methods

The endometria were obtained from normal women and from patients of sterility (primary) attending the J. L. N. Zenana Hospital, Ajmer in the age group of 18-40 years. The total number of 36 subjects have been divided into 3 groups—12 subjects forming normal studies, and the remaining 24 sterile cases. The sterility has been established on the basis of the history of the patients and routine clinical studies. Out of the 12 normal subjects, in 6 endometrial curettage was performed on the 12th day of the menstrual cycle and in the remaining 6 between 20th to 25th day of the menstrual cycle. In all cases endometria were obtained by curettage and the free aminoacids were studied by modifying the paper chromatographic method of Iyer (1955).

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A piece of the endometrium was subjected to histopathologic examination to ascertain the stage of the cycle and also to exclude cancer, etc.

Results

The free aminoacid contents of the normal and sterile endometria during secretory and proliferative phases are given in Table I.

sterile endometria at all during the secretory phase.

The values of the aminoacids Aspartic acid, serine, glutamic acid and threonine are low during the proliferative phase of sterile endometria in comparison to normal proliferative endometria, while alanine and glycine show a slight rise in these cases which is statistically insignificant. Tyrosine, cystine and phenyl

TABLE 1

Aminoacid mg/g tissue weight	Secretory Phase		Proliferative Phase	
	Normal (6)	Sterility (12)	Normal (6)	Sterility (12)
Aspartic Acid	.076 ± .005	.043 ± .003	.06 ± .01	.057 ± .01
Serine	.080 ± .005	.054 ± .03	.161 ± .0008	.156 ± .003
Threonine	.140 ± .005	.122 ± .003	.173 ± .0008	.168 ± .003
Alanine	.034 ± .005	.020 ± .0006	.060 ± .004	.062 ± .003
Tyrosine	.145 ± .0009	—	.207 ± .009	—
Cysteinine	.069 ± .001	—	.064 ± .005	—
Glycine	.157 ± .005	.136 ± .0006	.049 ± .005	.051 ± .003
Glutamic acid	.118 ± .005	.101 ± .003	.085 ± .005	.078 ± .003
Tryptophan	.121 ± .005	.107 ± .003	.220 ± .008	.220 ± .006
Phenyl Alanine	.214 ± .009	—	.204 ± .0008	—
Cystine	.162 ± .004	.113 ± .003	—	.164 ± .003

Figures in parenthesis are number of cases. S.D. ±

It is evident from the results that the values of aminoacids aspartic acid, glycine, glutamic acid, cysteinine and phenyl alanine in the normal secretory endometrium are higher as compared to the normal proliferative phase, while the aminoacids serine, threonine, alanine, tyrosine and tryptophan are present in higher concentrations during the normal proliferative phase. Cystine is detected in normal secretory phase and not in the proliferative phase.

The aminoacid values of the endometria of sterile cases during the secretory phase are low when compared with the aminoacids of the normal endometria, except for tyrosine, cysteinine and phenyl alanine, which were not detected in the

proliferative phase of the sterile endometria also. However, cystine was detected in the secretory phase of the sterile endometrium which could not be detected in the normal proliferative phase.

Discussion

Growth and differentiation of the uterus are regulated by the ovarian hormones. The qualitatively dominating process during growth is protein synthesis. Protein synthesis may in part be at least a function of the size of the free aminoacid pool or enhanced protein synthesis may elicit an increase in the pool size. Various authors have revealed that the functioning of endometrium and uterus

depends on the carbohydrate metabolism (Stein and Stuermer, 1951 and Stuermer and Stein, 1952). For the metabolism of glucose there must be enough basic protein in the cell to produce the key enzymes involved in the processes of glycogenesis and glycolysis (Cohen *et al.*, 1964). The synthesis of these enzymes is controlled by RNA and DNA which in turn are derived from the basic aminoacids. Changes in the activities of enzymes are related to the process concerned with growth differentiation and function (Atkinson *et al.*, 1949). Enzymatic failure might well account for the picture of poorly developed secretory endometrium of patients with abnormal bleeding and reproductive derangement. From Table I it is clear that there has been a significant reduction in the glycogenic aminoacids (aspartic, serine, threonine, alanine glycine glutamic, tryptophan and cystine) content during the secretory phase of the endometria of the sterile patients.

In patients with the history of sterility because of the decreased secretion of Glucose-6-Phosphatase and Alkaline Phosphatase together with the inability of tissue to synthesize aminoacids to RNA & DNA (Hughes *et al.*, 1963), the metabolisms of carbohydrate and protein are deranged. Thus, the concentration of glycogenic aminoacids is decreased. As the sex hormones effect the aminoacid content of blood and tissue, the hormonal disturbance or ovarian failure or anatomical, structural, and physiological ab-

normality of the uterus/endometria, results into reduction of the aminoacid production.

The alteration in the aminoacid concentration in the normal endometrium during proliferative and secretory phases could be attributed to the cyclic variation in the carbohydrate metabolism and associated processes like nucleic acid synthesis and availability of glucose and glycogen reserves.

Summary

Free aminoacid contents of endometrium during secretory and proliferative phase of 12 normal healthy women and 24 women with the history of sterility were studied. Most of the aminoacids were reduced in sterile patients. The reduction in aminoacids may be attributed to the hormonal disturbances and cyclic variations.

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