

Table 1. RADIATION INACTIVATION OF IMMUNOLOGICAL AND BIOLOGICAL ACTIVITIES OF HCG

Assay	$D_{37} \times 10^{-3}$ rads (95% limits)	Target volume- $\mu\mu^3$ (95% limits)	Mol. wt. $\times 10^{-3}$ (95% limits)
Biological			
Prostate weight	25.67 (23.10—28.91)	32.46 (28.57—36.36)	26.9 (23.7—30.1)
Testes weight	25.63 (23.12—28.76)	32.54 (28.74—36.35)	27.0 (23.8—30.1)
Immunological			
Hæmagglutination inhibition	63.01 (58.90—67.73)	12.90 (11.95—13.87)	10.7 (9.9—11.5)
Radioimmunoassay	58.31 (50.63—68.74)	14.01 (11.76—16.28)	11.6 (9.8—13.5)

The radiation dose required to reduce activity to 36.8 per cent (D_{37}) as measured biologically by prostate weight response was 25.67×10^6 rads ($\pm 1.29 \times 10^6$ (S.E.M.)) and as measured by testes weight response was 25.63×10^6 rads ($\pm 1.26 \times 10^6$). The D_{37} measured by hæmagglutination inhibition was 63.01×10^6 rads ($\pm 2.09 \times 10^6$) and by radioimmunoassay was 58.31×10^6 rads ($\pm 4.27 \times 10^6$). The target volume calculated¹ from biological data averaged $32.5 \mu\mu^3$. The target volume calculated from immunological data averaged $13.5 \mu\mu^3$. Assuming a density of 1.376 g/c.c. the molecular weight calculated from biological data was 27.0×10^3 , which agrees well with previous physical measurements⁹. The molecular weight calculated from immunological data was 11.2×10^3 .

These findings are interpreted as demonstrating that the structural unit required for immunological activity of HCG is considerably smaller than the unit required for biological activity.

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Origin of Neuraminic Acid in Human Seminal Fluid

THE occurrence and possible function of the neuraminic acids in mammalian tissues and fluids is a matter of great interest. Large amounts of *N*-acetylneuraminic acid have been demonstrated in the seminal fluid of man^{1,2}, bull³ and boar⁴. Analysis of the secretions of the accessory genital organs of the boar showed that the mucin from the bulbourethral glands contained 4–4.5 per cent (fresh weight) of neuraminic acid. The concentration was less in the seminal vesicles and negligible in the other glandular secretions⁵. In man the average concentration of neuraminic acid was in the seminal vesicle fluids 231.9 mg/100 ml., in the prostatic secretions 60.6 mg/100 ml., and in the seminal fluid 124.2 mg/100 ml. From these data, Warren² calculated that approximately two-thirds of the seminal fluid came from the prostate gland. It is, however, difficult to calculate the relative contribution of the various glandular systems to the ejaculate by using data obtained from extracts of autopsy material.

It is known that during ejaculation the three main glandular systems contributing to the ejaculate are discharged successively. The first portion comes from the prostate gland, the second from the testes and epididymis, and the third from the seminal vesicles. During ejacula-

tion the secretions from these three glandular systems become more or less mixed. By estimating the concentration of acid phosphates (from the prostate gland), spermatozoa (from the testes, epididymis and vas deferens) and fructose (from the seminal vesicles) in each portion of a 'split-ejaculate' it is possible to calculate the amount secreted by each of these glandular systems⁶.

In the present investigation the origin of neuraminic acid was examined by analysing each portion of split-ejaculates for its content of acid phosphatase, fructose and neuraminic acid. The procedure and analytical methods have been described earlier^{6,7}. Neuraminic acid was determined by the thiobarbituric acid method⁸. The various seminal fractions were not examined for their content of spermatozoa since the secretions of the testes, epididymis and ductus deferens are relatively small and probably add little to the neuraminic acid content of the semen^{9,10}. Analysis of the sperm cells by the Ehrlich or resorcinol test showed the presence of only very small amounts of neuraminic acid². Seminal fluid was received from five healthy male volunteers aged 25–30.

The analytical data from a typical experiment is presented in Fig. 1. The results indicate that neuraminic acid is secreted in nearly equal amounts from both the prostate gland and the seminal vesicles. This secretory pattern is not usual since most substances investigated are secreted mainly or entirely from a single gland.

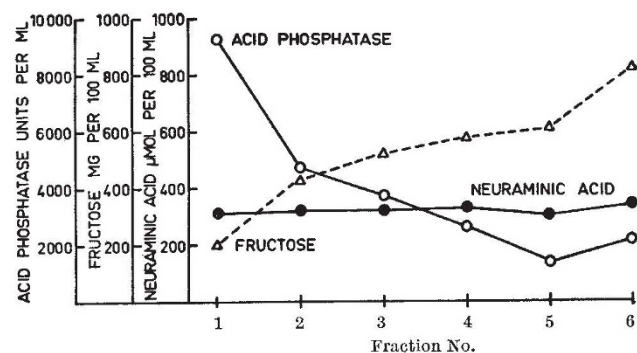


Fig. 1. Concentration of acid phosphatase, fructose and neuraminic acid in different portions of human seminal fluid collected with the 'split-ejaculation method'

The highest concentration found in the seminal vesicle secretions (last fractions) was 430 $\mu\text{moles}/100$ ml. This is lower than the mean value (750 $\mu\text{moles}/100$ ml.) given by Warren² for the seminal vesicle fluid obtained at autopsy. Moreover, the mean value given by Warren² for the prostatic fluid (196 $\mu\text{moles}/100$ ml.) is below the concentrations found in the first fractions of the ejaculates (250–350 $\mu\text{moles}/100$ ml.).

The concentration of neuraminic acid in the total ejaculates varied between 200 and 350 $\mu\text{moles}/100$ ml. This is in the same order of magnitude as found by Svennerholm¹ and Warren².

The significance of neuraminic acid for human fertility is not known, but work on this problem is in progress.

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