

GLUTAMINE AS A GROWTH FACTOR FOR CERTAIN STRAINS OF NEISSERIA GONORRHOEAE

CHARLES E. LANKFORD AND ESMOND E. SNELL

*Department of Obstetrics and Gynecology, University of Texas Medical Branch, Galveston,
Biochemical Institute, and the Clayton Foundation for Research,
University of Texas, Austin*

Received for publication April 5, 1943

That certain strains of *Neisseria gonorrhoeae* require for growth a thermolabile factor present in blood and extracts of fresh yeast and liver has been observed by

TABLE 1

SUPPLEMENT*	CONCENTRATION	STRAINS TESTED					
		2999	4698	4842	4792	4818	4995 ("normal")
0	<i>mgm. per cent</i>	0	0	0	0	0	++++
Filtered yeast extract (1/100).....		++++	++++	++++	++++	++++	++++
Autoclaved yeast extract (1/100).....		0	0	0	0	0	++++
Glutamine (filtered).....	.001	0	0	0	0	0	++++
Glutamine (filtered).....	.01	±	±	±	0	0	++++
Glutamine (filtered).....	.1	++	++	++	+	+	++++
Glutamine (filtered).....	1	++++	++++	++++	++++	++++	++++
Glutamine (filtered).....	10	++++	++++	++++	++++	++++	++++
Glutamine (filtered).....	100	++++	++++	++++	++++	++++	++++
Glutamine (autoclaved)...	1	±	0	±	0	0	++++
Glutamine (autoclaved)...	10	++	++	++	+	+	++++
Glutamic acid.....	1	0	0	0	0	0	++++
Glutamic acid.....	10	0	0	0	0	0	++++
Glutathione.....	10	0	0	0	0	0	++++

* Proteose no. 3—hemoglobin agar (Bacto) base.

0, no growth; ±, minimum detectable growth; +++++, maximum growth.

Lankford (1942) and Christensen (1942). The incidence of such strains in cases of gonorrhoea is such (10-15 per cent) that the addition of the active factor to autoclaved media employed for the diagnosis of gonorrhoea is desirable. Certain properties of the active fraction of yeast extract suggested that glutamine might be the essential factor involved. Glutamine has been reported by McIllwain, *et al.* (1939) and Fildes and Gladstone (1940) to be an essential growth factor for Group A hemolytic streptococci, although not required by the strains of gonococcus tested.

EXPERIMENTAL

The base media employed were Proteose no. 3—hemoglobin agar (Bacto) and Proteose no. 3—starch agar. On these media growth of "normal" strains of gonococcus is rapid and moderately heavy, whereas the fastidious strains usually fail to produce any visible growth at 48 hours unless filtered extracts of yeast, liver or other tissues is added. Ability of glutamine (SMACO) to replace these extracts was tested by adding sterile solutions of it to the base medium. All fastidious strains grew rapidly and luxuriantly in its presence.

The optimum concentration of glutamine for the majority of strains tested is 1-2 mgm. per cent, whereas detectable growth may occur with as little as .01 mgm. per cent. Autoclaving the glutamine for 10 minutes at 15 pounds greatly reduces its activity, as is also the case with yeast extract. The specificity of glutamine is emphasized by the failure to substitute glutamic acid or glutathione. It seems probable, therefore, that these exacting strains are unable to replace the labile amide group of glutamine (see table 1).

REFERENCES

- CHRISTENSEN, C. W. 1942 Personal communication.
FILDES, P., AND GLADSTONE, G. P. 1940 Glutamine and the growth of bacteria. *Brit. J. Exptl. Path.*, **20**, 334-341.
LANKFORD, C. E. 1942 Some aspects of nutritional variation of the gonococcus. *J. Bact.*, **44**, 139 (abstract).
McLLWAIN, H., FILDES, P., GLADSTONE, G. P., AND KNIGHT, B. C. J. G. 1939 Glutamine and the growth of *Streptococcus hemolyticus*. *Biochem. J.*, **33**, 223-229.