Hyperprothrombinæmia During Pregnancy

THE determination of prothrombin in blood plasma acquired especial importance after the discovery[1] of vitamin K, which is known to play a certain part in the formation of prothrombin. During my researches on the normal and pathological variations of prothrombin I have found the concentration of prothrombin in pregnant women to be remarkably high, a condition not formerly known.

The determination of prothrombin in plasma has been carried out according to a method recently indicated by me[2]. My method differs from those of others in that the prothrombin is determined in relation to a standard prothrombin solution. It has proved justifiable to take the blood plasma of the investigator as a standard solution. By means of this method the prothrombin values of 104 normal persons of both sexes have been determined. If the average value is put at 100, the distribution has been found to range from 82 to 118 with a standard deviation of 6·58.

The results of the determinations of prothrombin in pregnant women are seen in the accompanying table. The figures indicate the average prothrombin value in the women examined.

Month of pregnancy	Number of subjects	Average prothrombin value
1–2	7	105
2–3	8	111
3–4	7	123
4–5	5	136
5–6	4	149
6–7	7	146
7–8	5	152
8–9	27	169

It is apparent from this table that the average prothrombin values of all pregnant women examined after the third month of pregnancy are considerably higher than the average value of the normal material and exceed the highest values observed in the latter. The figures indicate a steady rise from the third month until the end of pregnancy.

One month after delivery, normal prothrombin values are found.

The significance of hyperprothrombinæmia in pregnant women will be further elaborated in a forthcoming publication.

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Interferometric Serum Test for Cancer

A PRACTICAL optical test of the blood serum that appears to prove of assistance in the early diagnosis and prognosis of cancer is here described, the validity of which has been ascertained in a few hundred clinical cases.

The test involves the measurement of the densities of a certain number of samples of the person's blood serum, by the use of an interferometer. The density to be determined is the result of interaction between an extract of cancer cells and the serum under examination.

Previous studies leading up to the test were those of Dr. Ernest Freund and G. Kaminer[1], F. Neuberg and A. Waterman[2], further refined by Drs. R. Willheim and K. Stern[3]. The first four investigators claimed to have established the following facts: A lysis of cancer cells takes place in the blood serum of non-cancerous persons. Serum of cancerous persons has not only no lytic substance but even a substance which protects cancer cells from destruction.

Willheim and Stern, however, stated that a diagnosis of carcinoma could not be made merely by determining the presence or absence of any specific cancer-destroying substance. They postulated the existence of cancer-destroying and cancer-protecting chemical principles in the serum, the difference in the balance of which determined whether or not a serum could be clinically associated with carcinoma.

It seemed that a surer and simpler diagnostic reaction should be obtained by using an extract of human cancer cells instead of the whole cells. An alcoholic extract of carcinoma of the breast, because of its convenience of freedom from infection, was prepared to serve as the testing agent. Four test tubes are set up. Into each of these is pipetted the same amount of cancer extract, 0·05 c.c. Next, the serum to be tested is added in each tube in increasing amounts, 0·05, 0·25, 0·5 and 1·0 c.c. respectively. Thus four grades of dilution of the extract with the serum are established. The tubes are then incubated at 37° C. for 12 hours. Serum is then added to the first three tubes until the level is the same as for the fourth test tube. All tubes are carefully shaken and allowed to settle in a refrigerator for six hours.

Interferometer readings are made to obtain the densities of the four dilutions of the extract with the serum. The pattern of the readings plotted out graphically shows a characteristic difference between the cancerous and non-cancerous sera.

Compared with the pattern of the four interferometric readings of normal serum, that of the cancerous serum shows a 'disturbed balance' between the cancer-lytic and cancer-protective properties.

A cancer curve slowly changes to a normal curve after successful operation. It changes again from a normal to a cancer curve in the earliest stages of recurrence. A cancer curve does not change post-operatively if metastases have already taken place or are about to take place elsewhere in the body.

The test reaction failed to appear when serum of a pregnant woman or of a person with tuberculosis, syphilis or numerous other diseases was used. However, as was to be expected, fever and intensive X-ray treatments influenced the serum so as to make the test uncertain. Extract of normal organs, for example, fibroid tissue, failed to show any reaction.

This preliminary report deals with 325 cancer cases in which the test was proved to be 96 per cent correct. Altogether 575 cases have been tested.

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[2] Waterman, A., *Biochem. Z.*, **188**, 65 (1927).
[3] Willheim and Stern, *Biochem. Z.*, **239**, 473 (1931).