Summary

The effect of cortisone on the experimental gastric ulcer produced by intraperitoneal injection of histamine in the guinea pig is studied. A reduction in the number of animals showing gastric ulcer in observed. The possible mechanism of this effect of cortisone is discussed.

Résumé

L'effet de la cortisone sur l'ulcère expérimental gastrique produit par l'injection intrapéritonéale de l'histamine, chez le cobaye est étudié. Une réduction dans le nombre des animaux porteurs d'ulcères est observée. Le mécanisme possible de cet effet de la curtisone est discuté.

Acknowledgment: The authors express their appreciation to Professor Carl E. Hopkins for his kind help in the preparation of the text. The supply of Cortisone (R) by Ciba Laboratories is also acknowledged.

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The Measurement of Isodose Curves of a Cobalt Unit by a Photographic Technique ✲

By

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Intoduction

When using X – or gamma–rays in the treatment of cancer, it is necessary to know the distribution of the patient's body, so as to be sure of accuracy of dosage to the tumour and to avoid the possibility of overdosage of normal tissues. This distribution is normally found by the use of isodose curves; these are curves joining points of equal dosage, the intensity of which is related to the maximum dose found in the treated volume. A typical example is shown in Fig. 1, which relates to a cobalt unit; it is seen that the maximum dose occurs at a depth of 0.5cm beneath the surface, and that the curves are symmetrical about the beam axis.

For a cobalt unit, the shape of the curves may depend on the physical dimensions of the source, the design of the beam–limiting diaphragms, and the ratio of source – skin–distance to source - diaphragm distance. Since these all vary from Centre to Centre, it is essential that the curves be measured individually, for all field sizes in common use.

However, it is found the doses alons the central axis depend only on the field size and the source–skin distance, and do not vary with the design of the treatment unit. Here, it is convenient a quantity konwn as the percentage central axis depth dose, which is specified as the

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dose at a point on the central expressed at a percentage of the maximum dose. These values have been measured at many Centers throughout the world, and are tabulated for depths up to 30cm in many well-known publications, such as the British Journal of Radiology. Supplement No. 10.

Since investigation of dose in a patient is often difficult and inconvenient, a substitute medium has to be used. Depth doses and isodose curves are therefore usually measured by means of an ionization chamber in a tank of water; since water has an atomic constitution very similar to that of soft tissue, the distribution measured in a watertank will be closely similar to that in the human body. Such a watertank is usually known as a water phantom.

When using such a water phantom, the ionization chamber is moved about in it (by a remote - control device) to accurately - known positions, and readings of dose made. To reduce the number of readings needed, it is usual to take traverses across the beam at a number of fixed depths; from these, the isodose curves can be constructed by cross-plotting the results.

Alternative Photographic Technique

In the present investigation of the isodose curves from a Theratron Junior cobalt unit, a water phantom was not available, and an alternative measurement technique had to be found. Since it is known that the blackening of a photographic emulsion depends on the dose it has received photographic measurements are applicable. If a film is exposed "edge-on" to the beam, then the isodose curves may be constructed from the resultant pattern of blackening.

Since films cannot be placed in water, a substitute medium must be found, and pressdwood (quilders' hardboard) was used. This is readily available in sheets which can be cut to a convenient size; furthe-rmore, its average atomic composition is very similar to that of soft tissue.

In the hands of one of us (W.H.F.), the technique has been found previously to have several disadvantages.

a) The film response is non-linear i. e. doubling the exposure does not result in twice the blackening.

b) It is difficult to reproduc exposure and development conditions exactly, which means that each film must be individually calibrated.

c) Annoying streaks and blotches are present in the developed films, giving rise to irregularities in the isodose curves. Some acceptable method (i.e. not involving guesswork or a priori knowledge) must be found to smooth out these irregularities.

Decrement Lines

If we measure the central - axis depth dose D at a depthd, and then measure the distance x lateral to this axis at which the dose falls to a fixed fraction (say, 50%) of D, then it is found that a graph of x against d is a straight line. This line is called a decrement line; similar lines can be drawn for other fractions of the central axis depth dose. An example is shown in Fig. 2; for clarity, percending values of decrement line have been plotted on alternate sides of the central axis. At any point on, say, the 70% decrement line, the depth dose is 70% of the central axis depth dose at the same depth; if therefore, we know the central axis depth doses and the constants of the decrement lines, isodose curves can be drawn.

Since the decrement lines are straight, they can be described by equations of the form:

$$x = md + c$$

where m is the slope of the line, and c is the intercept at zero depth. The values of m and c can then be plotted against the value of th decrement line, and smoothed values of the constants read off from this graph. Furthermore, the smoothed constants for, say, the 40% line can be plotted against the field size and further smoothing performed. This procedure fulfils the requirements mentioned in c of the previous section.

Technique

Ordinary X-ray film was used, as it was easily available in the department. To avoid exposure of the film to light, the film was placed between two sheets of pressdwood, so that one edge of the film coincided with the edges of the sheets, and the edges of the sandwich thus formed were sealed with black paper strips held on with Sellotape; the whole procedure was carried out in a darkroom. The sandwich was then surrounded by other pressdwood sheets to build up a phantom about 30 cm cube.

The phantom was then irradiated, after setting it up (on the couch of the cobalt unit) in such a position that the central plane of the beam coincided with the plane of the film; this is illustrated in Fig. 3. An exposure time of 1½ seconds was used, corresponding to an incident dose of about 3 roentgens; this gave rather a dark film, but it was not practicable to reduce the exposure any further. It would have been better if a much-less sensitive film (such as Ilford type nN50 line film) could have been used; this would have allowed exposure doses up to about 100 roentgens, with a longer exposure time.

The films were developed by the ordinary radiographic darkroom procedures employed at the hospital. Reproducibility of these conditions was very difficult to attain, and was not important as each film was self-calibrating as described below; however, efforts were made to ensure uniformity of developement over the whole area of each film by frequent agitation. The appearance of a developed film is show in Fig. 4, on which the beam outline and configuration can clearly be seen.

The density of the film was read on a Bldwin densitometer which was available in the department. The fog density was first found by looking for the point of minimum blackening on the film; the densitometer was then adjusted until the density reading at this point was zero. All subsequent density readings were thus automatically compensated for the background, fog density.

Density readings were then made at frequent intervals across the film, at various distances from the entrance edge. These readings were greatly facilitated by the use of graph.paper distance scales, fixed to the base-plate of the instrument by Sellotape. Graphs were drawn of density against lateral co-ordinate, for all the traverses measured, and some of these are shown in Fig. 5.

Reduction of results ·

For each traverse depth, the corresponding central-axis depth dose could be found by reference to the published tables already mentioned. When these were plotted against the corresponding maximum density found on the traverses, a graph similar to Fig. 6 was produced; this

was the calibration graph for the film. It is seen to be violently non-linear; also, since the films were darker than is ideal, there was a shortage of points near the origin. To overcome this, an extra traverse (not used in subsequent calculations) was done at the greatest depth that the film would allow-normally 29 cm. This gave an extra low-density point; since the graph is known to go through the origin, a good curve may be constructed in the low-density region.

The divergence of some of the points from a smooth curve was due to the presence of streaks and blotches mentioned above. From this graph, the depth dose corresponding to any density could be read off, and the density traverses converted into depth dose traverses. The lateral displacements corresponding to the 95,90.80,70..... 10% decrement lines could then be read off for each traverse, at the traverse depth.

The decrement lines were then drawn in by eye. A least-squares procedure could have been used to get the best fit, but was not thought worth while in view of the large amount of cross-plotting still to be done. The constants m and c were measured for each line by the usual methods, and these were graphed against the value of the decrement line giving the results shown in Fig. 7. From this, the best values of m and c for each line could be read off.

Similar graphs were produced for a number of field sizes, and the smoothed decrement line constants plotted against field dimension. A typical graph, for the constants of the 50% line, is given in Fig. 8. From this, and similar, graphs, smoothed values were read off, and the best decrement lines drawn for all field sizes. Using these, and tabulated central axis depth-doses, full isodose curves simillar to Fig. 1 were constructed.

Discussion

The method is successful in producing self-consistent sets of curves, it reduces the effect of streaks and blotches. as well as errors due to inaccurate setting-up and adjustment of the beam-defining diaphragms. Besides being inexpensive, it has the advantage that the cobalt unit itself is needed for only about five minutes per field; all the rest of the work is done in the laboratory. In contrast, the ionization chamber method would need the unit for an average of one hour per field, with consequent disruption of treatment schedules.

The method gives results which are accurate enough for clinical purposes; it would be desirable, to check the curves with a water phantom when this becomes available. However, it is believed that the method affords an example of how sophisticated results may be obtained by very crude and simple means; this is a lesson that may well be learned by many scientists in Iran.

Acknowledgements

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Summary

A method is described whereby the isodose curves of a cobalt unit were measured, using a simple photographic technique. The method reduces the effects of experimental errors and artifacts by cross-plotting the constants of decrement liner. The method is self-calibrating, and affords a useful alternative to the more usual water phantom procedures, in cases when this apparatus is not available.

Isodose curve for 10x10 Size at 55 cms SSD

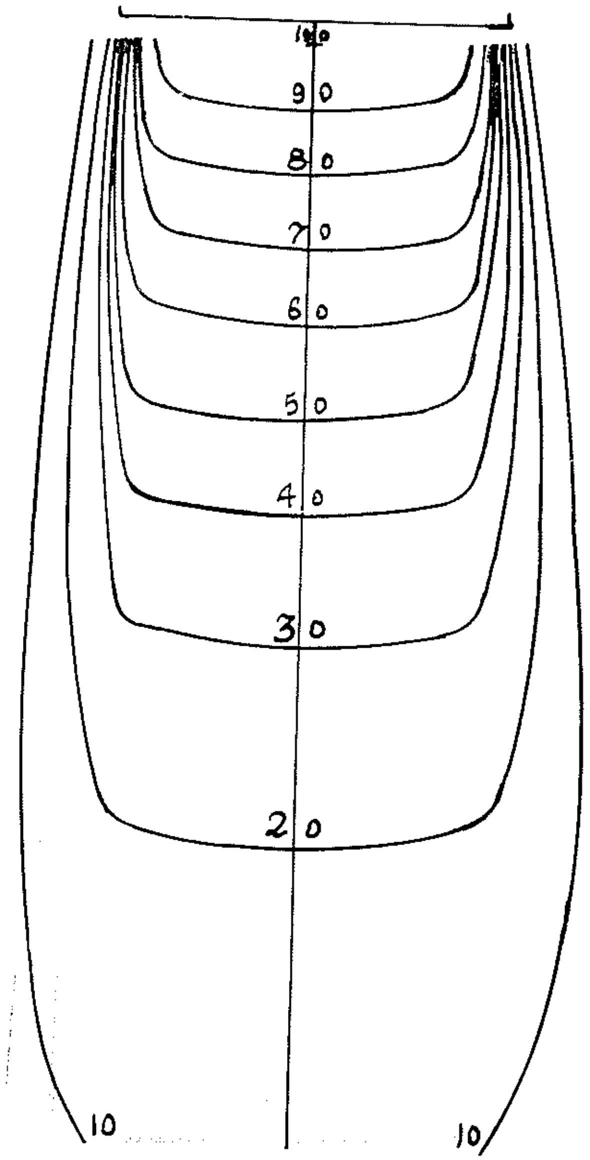


Figure. 1

Smothed decrement for 10x10

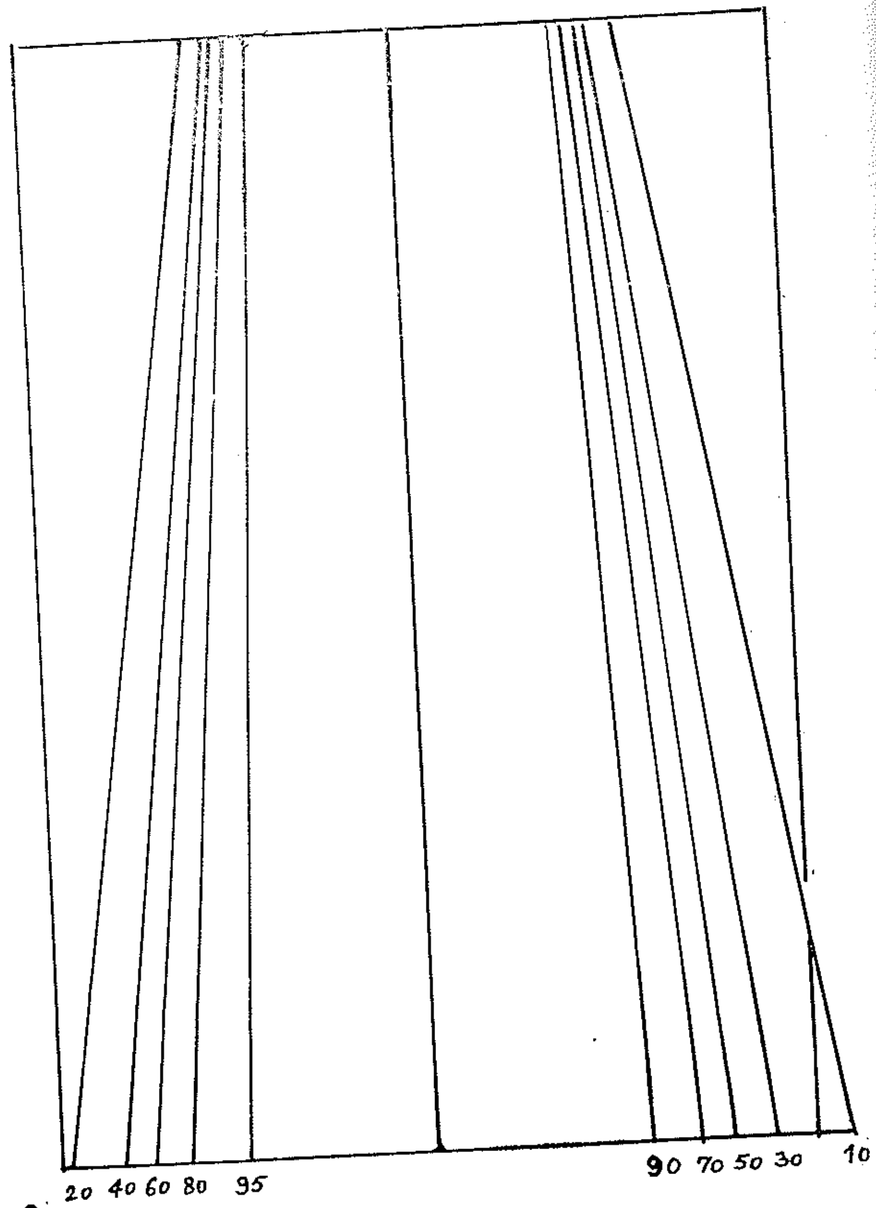


Figure. 2

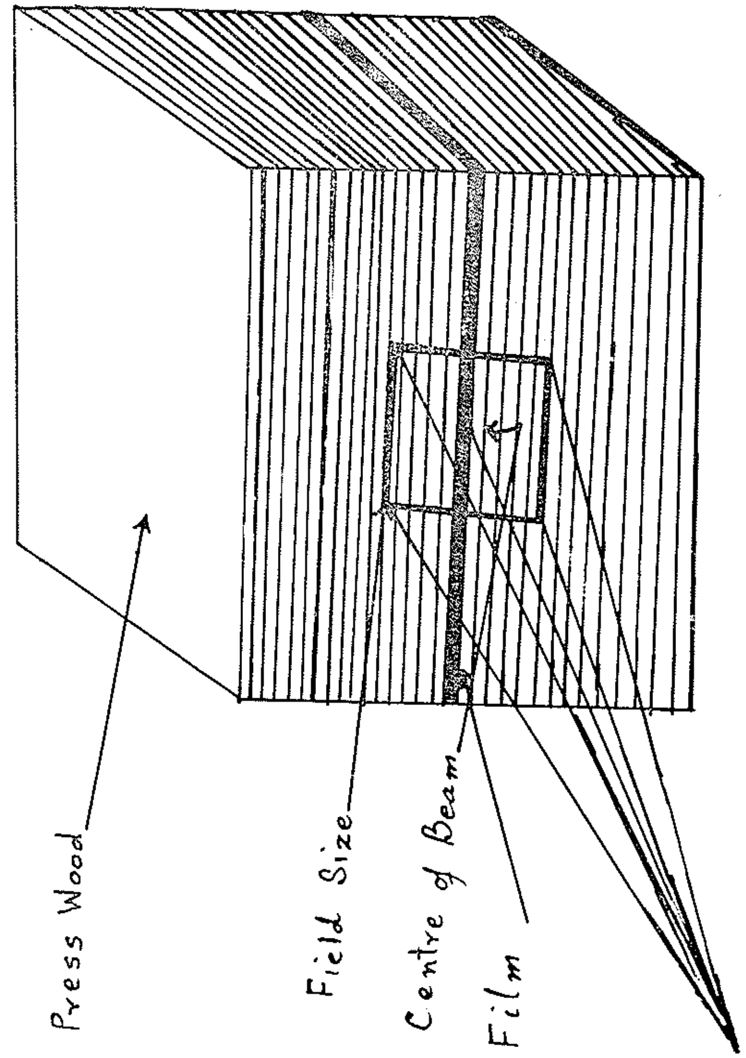


Figure. 3.

Figure. 4

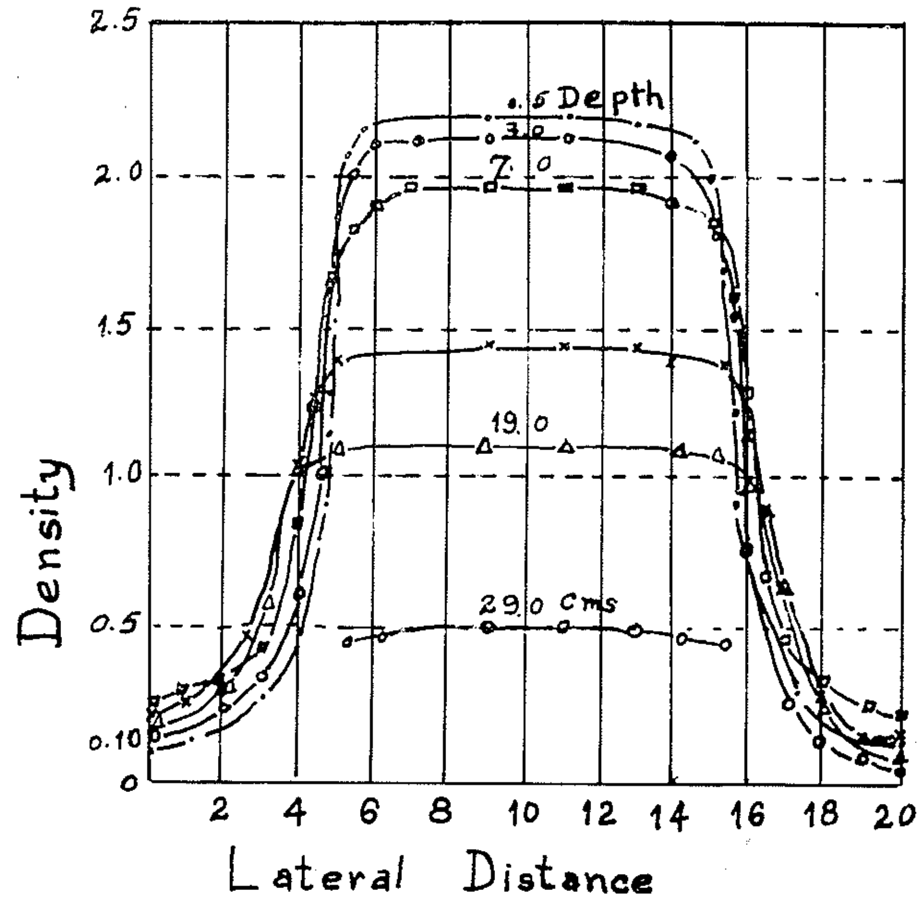
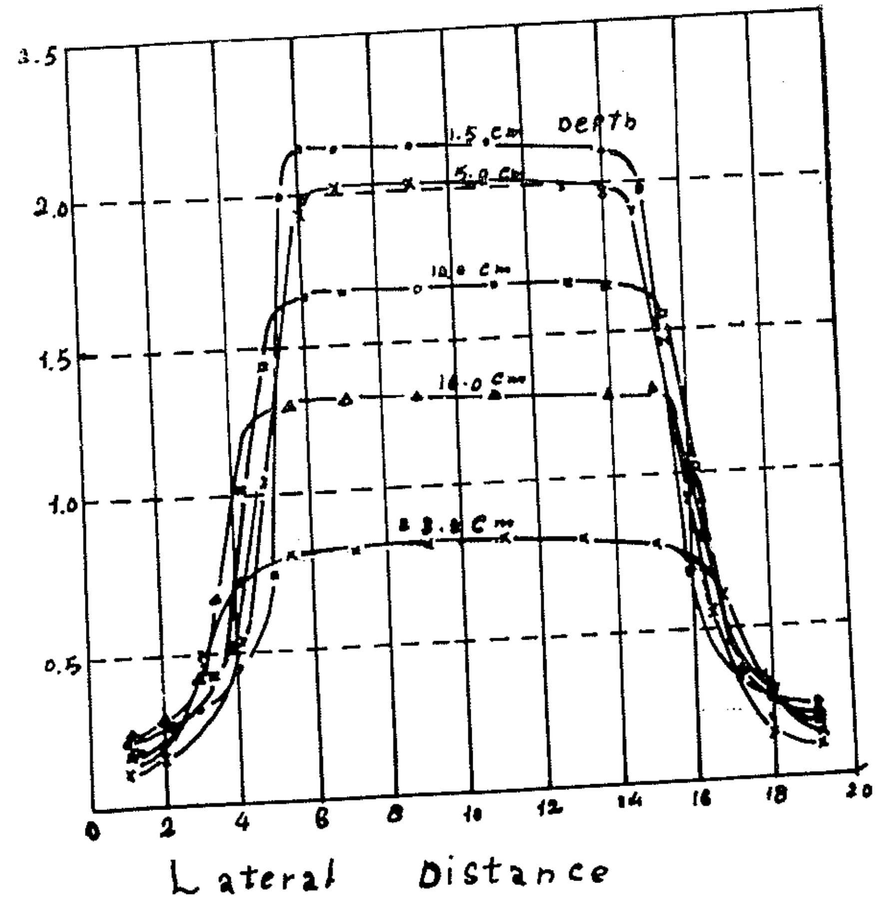


Figure. 5 a


3.5
2.0
1.5
1.0
0.5
1.5 cm Depth
5.0 cm
10.0 cm
16.0 cm
23.8 cm
0
2
4
6
8
10
12
14
16
18
20
Lateral Distance

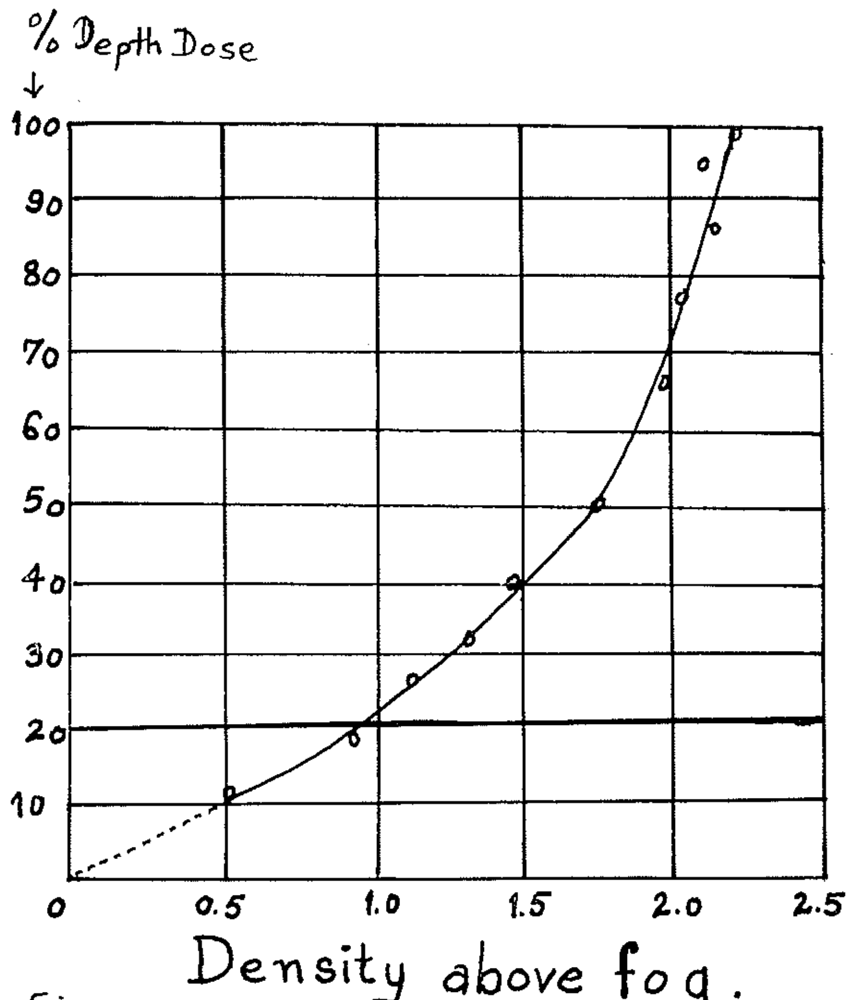

% Depth Dose
100
90
80
70
60
50
40
30
20
10
0
0.5
1.0
1.5
2.0
2.5
Density above fog.

Figure. 6

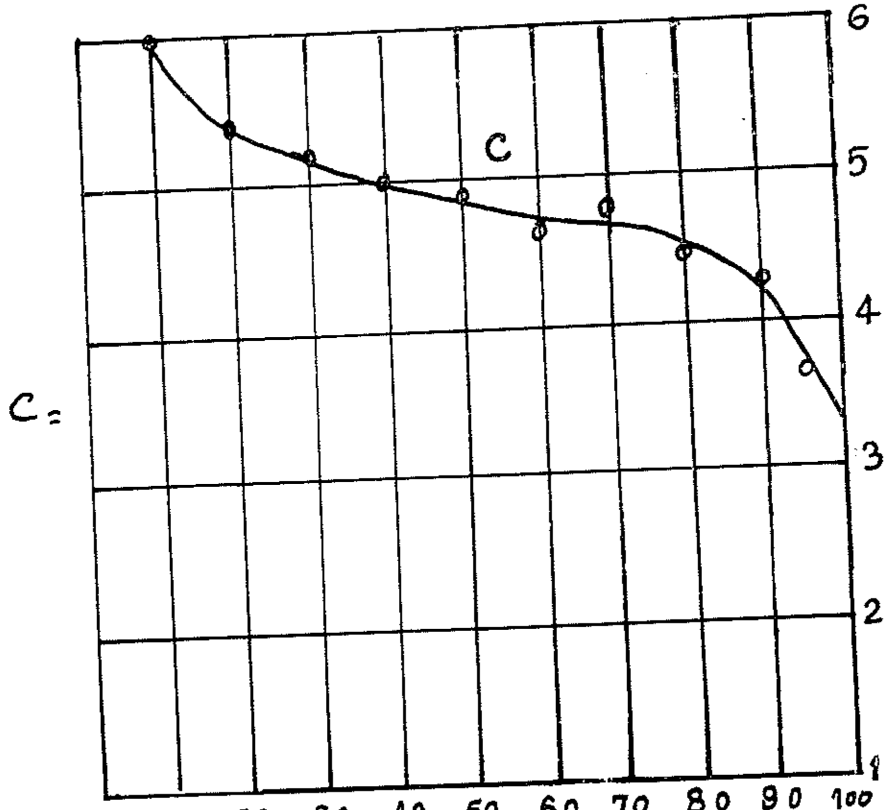


Figure. 7.a Decrement Line

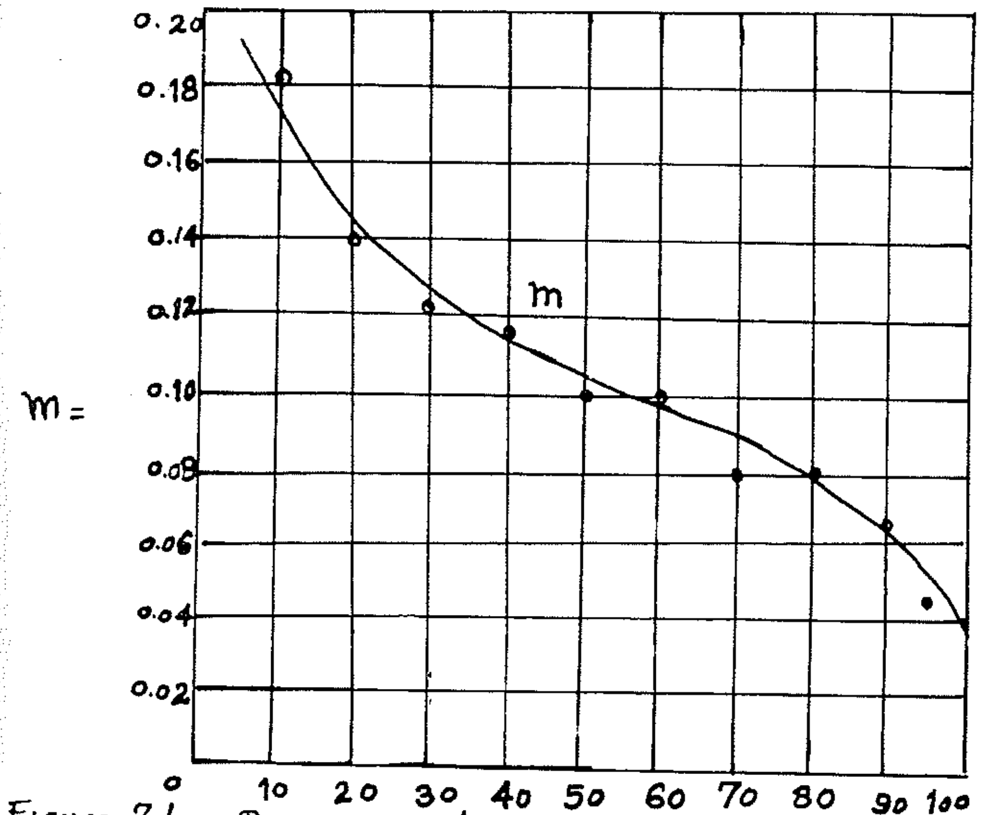


Figure. 7 b Decrement Line

50 %

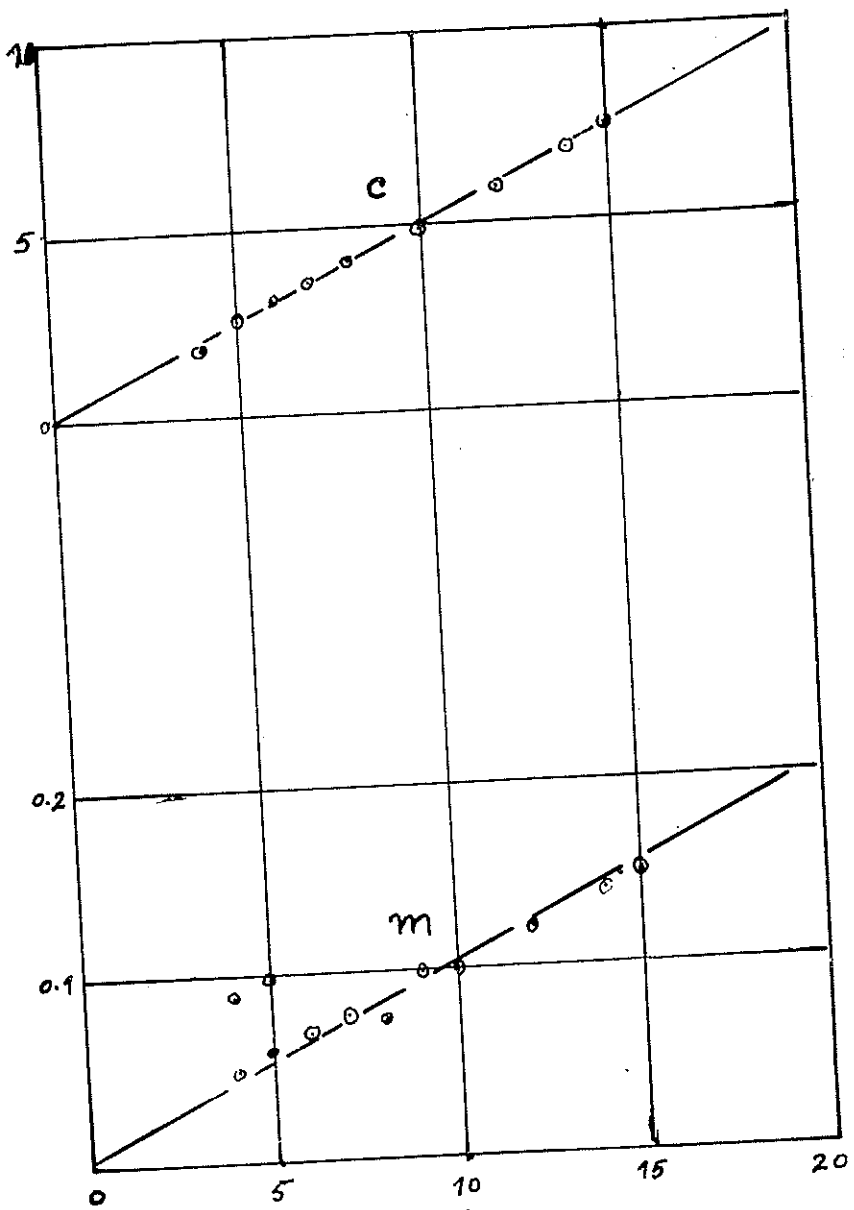


Figure. 8 Field Size

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PREGNANCY IN CARDIO-VASCULAR SURGERY

By

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The incidence of heart diseases in pregnancy is about 15% fifteen percent and by far Mitral Stenosis is the most common phenomena among acquired heart diseases and congenital heart diseases in pregnancy.

In the early days of the 19th century it was believed that a woman suffering from any kind of heart disease was not allowed to marry and if married not to have full satisfaction in matrimonial relationships. Obviously, pregnancy was absolutely countarindicated and early dilatation and curetage was justified, in order to make life longer for the unfortunate mother and consequently not to let the suffering mother go through extra mental complexities.

Since 1948, right after the contribution of Dr. Charles, P. Baily and many others to the field of Cardio_Vascular Surgery, a new era, a new hope arose among these patients. Dr. F. J. Brown made the bold statement: "There is certainly in the majority of cases, no longer any justification for the termination of pregnancy and sterilization in a woman with congestive heart failure in valvular disease".

Since 1957 approximately eight hundred thoraric and cardiovascular operations have been performed in the Department of Surgery at Pahlavi Hospital, in the University of Tehran, and in some private clinics as well. There has been twenty-four cases of Cardio-Vascular Surgery associated with Pregnancy in our files, twenty_two for Mitral Cammissurotomy, one case of simultaneous mitral Cammissurotomy and Aortic Cammissurotomy and one case of Pulmonary Stenosis.

Patients suffering from Mitral Stenosis frequently have their first heart failure during pregnancy. There is no doubt that many of these

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