After 24 hours the water in the tube will have decreased to a small fraction of the original volume. This water is removed with a pipette and tested for protein. If the test is negative, the collodion tube is suitable for use.

The dilute protein solution to be concentrated is transferred to the tube and dialyzed against egg white. As the solution becomes concentrated more of the dilute solution is added to it from time to time. The dialysis is continued with frequent change of the egg white until the desired concentration is reached. If it is necessary to remove the crystalloids which have come into the solution from the egg white, this can be accomplished by dialysis under pressure against distilled water in the usual way.

## 4492

## Behavior of Adrenal Transplants in the Transparent Chamber Inserted into the Rabbit's Ear.

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Adrenal transplants were made into the ears of 6 adult rabbits by means of Sandison's technic.[1] The left adrenal gland was removed aseptically from the rabbit and placed in warm saline for 10 to 15 minutes. Thin pieces of both cortex and medulla were taken and inserted into the chamber adjacent to the blood vessels. Immediate observation showed that the transplant consisted of cell masses too opaque to be clearly seen, with a few isolated cells at the edge. These individual cells appear to live for 2 to 4 weeks, exhibiting some migrating activity but never active amoeboid movement. They are quite large and show vacuoles and a number of highly refractile granules. In 4 days to a week the vacuoles became more numerous and many of the cells began to shrink, fragment and disappear. No cells were seen to be growing and multiplying.

The main transplant showed some living cells along the margin but the center when visible appeared to be necrotic and became slowly absorbed in the course of about 4 weeks.

The transplant apparently retards the growth of the connective tissue and blood vessels in the chamber. No adrenal cells were seen to live in among the connective tissue, nor was there any indication

[1] Sandison, J. C., *Am. J. Anat.*, 1928, xli, 447.

of reaction about the transplant, except for the presence of a few leucocytes and macrophages. Occasionally a zone of leucocytes, 3 or 4 cells deep, was found next to a degenerating mass.

All 6 rabbits, 5 with autotransplant and one with hemotransplant showed quite similar findings. None of the transplants exhibited signs of growth or survived longer than 6 weeks.

Attempt was also made to transplant the adrenal in 2 stages. The transparent chamber was first inserted into the ear of the rabbit. When the growth of blood vessels became profuse throughout the greater portion of the chamber, a second operation was made to remove one adrenal, thin pieces of which were inserted into the chamber. There was no hemorrhage.

In the first few days the blood vessels and connective tissue did not show any reaction towards the graft, which appeared to draw its nourishment from the lymph in which it was bathed. On the third day, the capillaries increased in number with a more rapid flow of blood through them and some extravasation of red blood corpuscles occurred. More leucocytes were seen on the fifth and sixth days, although phagocytosis was not actually observed.

In the week following, regeneration of the transplant was noted to go on hand in hand with degeneration. Most of the cells in the center of the transplant degenerated rapidly, while cells along the edges continued to grow. Mitotic figures were only rarely seen. Columns of cortical cells were now visible, separated from the main transplant, some presenting the typical appearance of the fascicular zone of the adrenal gland. Daily measurement with an eye-piece micrometer showed that these columns increased, *i. e.*, grew, in length for a week or two. Medullary cells must have degenerated, for none were seen.

By the third and fourth week, the graft became canaliculized with blood vessels and a number of columns of cortical cells became easily visible. The cells were rendered clearer after subcutaneous injection with neutral red according to the technic described by W. C. Ma and H. C. Chang,[2] although the cell granules were not distinctly stained. In the fifth week, however, a retrogression in the growth appeared and most of the columns became broken up into segments and individual cells, which degenerated and were gradually replaced by connective tissue cells. By the twelfth week only a few scattered cells and a few columns remained.

Jaffe[3] records that his adrenal cortex transplants (into abdominal

[2] Ma, W. C., and Chang, H. C., *Chinese J. Physiol.*, 1928, ii, 381.

[3] Jaffe, H. L., *J. Exp. Med.*, 1927, xli, 587.

wall of guinea pigs) were still viable after 276 days; Busch, Leonard and Wright[4] that segments of whole adrenal gland implanted in the kidney (rabbit) survived for 274 days. Pybus[5] and Leschke[6] report successful homotransplantation in humans with Addison's diseases; the grafts apparently lived for a year or longer. All other attempts at transplantation have more or less failed.

The results here described show that an implant will only grow so long as the growth of connective tissue is held in check.

Jaffe suggests that the presence of medullary tissue in the graft prevents successful takes.

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[4] Busch, F. C., Leonard, T. M., and Wright, T., *J. Am. Med. Assn.*, 1908, li, 640.

[5] Pybus, F. C., *Lancet*, 1924, 550.

[6] Leschke, E., *Med. Klin.*, 1928, xxiv, 1268.