Discussion

Dr. Thomas C. Moore (Los Angeles): We have had one of Dr. Belzer's machines in our laboratory at the UCLA-Harbor General Hospital for the last year and have been tremendously impressed by its value, both in the laboratory and in the clinic.

The truck he showed in one of his slides brought two kidneys to our hospital in Los Angeles from San Francisco 3 months ago. One kidney was hyperacutely rejected at the time of a third transplant which was carried out as a hyperacutely rejected second transplant was being removed. This process was not modified by the administration of 150 mg. heparin before removal of the vascular clamps. The other patient received a first transplant. The kidney, which was 31 hours old, produced urine immediately and the patient was released from the hospital two weeks after transplantation. He has continued to have excellent renal function.

I think Dr. Belzer's work and his machine are tremendous contributions to transplantation and, at least from my standpoint, provide by far the best means of preservation we have today. This machine and its many advantages simplify many aspects of the complex problem of cadaveric renal transplantation.

Dr. Willard E. Goodwin (Los Angeles): I would like to point out that not everyone has or can afford Dr. Belzer's perfusion device.

At UCLA we do not enjoy this, except through the graces of Dr. Moore and so the poor man's way is to harvest the kidney as quickly as possible; (slide) and get it cold perfused and transplanted into the patient.

This kidney was removed in Portland, Oregon, at 6 o'clock in the morning by Dr. Lawson and his team. It was sent by commercial transport in a bucket of ice, and you see it now 9½ hours later just after it has been put into a little girl at UCLA.

She went through a period of tubular necrosis and required two dialyses but subsequently has reached normal renal function with a creatinine around 1.2. The mate of this kidney, which was immediately transplanted in Portland, is also doing well, but actually the two kidneys are doing equally well. I just wanted to point out that it is possible to have this lapse of time under these circumstances, even with transport of a kidney by ordinary means from as far a distance as Portland, Oregon to Los Angeles.

Dr. Folkert O. Belzer (Closing): I certainly feel we should not make a habit of transporting kidneys in this fashion, as it undoubtedly is somewhat cumbersome. But at least this one occasion showed that it was feasible. As far as Dr. Goodwin is concerned, we all know that the kidney is a remarkably sturdy organ.

About a year ago, Dr. Sven-Eric Bergentz published an article in the *Annals of Surgery* showing that the human kidney could withstand periods of preservation by simple hypothermia for up to 11 hours, and I believe that one of these kidneys opened up right away. Unfortunately, this does not work that way all the time; some of the recipients of these kidneys require long periods of postoperative dialysis, and if the kidney recovers, the renal function is often abnormal. If a kidney is removed from an ideal donor, and especially if the warm ischemia time is kept to the absolute minimum, it can probably be stored fairly satisfactorily for periods of up to 10 hours without too much damage to the organ.

The method of preservation that we presented appears to be equally satisfactory for partially damaged grafts but also allows us to test the kidney prior to transplantation. We received a kidney from Oregon some time ago. After it was put on the preservation unit it did not seem to perfuse very well, so that it was not used for transplantation. We subsequently discovered that the other kidney which was transplanted immediately in Portland never worked satisfactorily either. Thus, we feel that determination of satisfactory and unsatisfactory grafts prior to transplantation is an important factor and advantage of this method of preservation.