DISCUSSION

The Chairman (Parsons, Leeds): Thank you, Dr. Kaplan de-Nour. These three papers are now open for discussion. They raise many controversial issues.

THIOU (Basle): I have a question for Dr. De Palma about his sixth adolescent patient. Can you give some comments about her growth rate and sexual development, please?

De Palma (Los Angeles): The programme began in September 1967, so that, as far as growth measurements are concerned, we are just beginning. Secondly, the reason we are doing haemodialysis or initially started it is as a holding action for cadaver transplantation, so that our approach was not long-term haemodialysis as an end in itself. The success has been so dramatic with these children—the cannula function, the acceptance of the prosthetic device—that we are considering training some of these parents and children for home dialysis as a holding action for transplantation. This is something that will be coming up within the next year if our results with uraemia control are as good as the first six.

Shaldon (London): I have a question for Dr. Kaye, but first I should like to confirm Dr. De Palma’s results and perhaps answer the question on growth. We have had the opportunity to observe a young boy going through puberty and growing over 10 centimetres on four times a week dialysis for a year, being dialysed in the home by his mother, and I think that his remarks on the ease with which these children are dialysed can be substantiated. I was very interested to hear Dr. Kaye’s paper and I think my own philosophy on the subject is similar to his, although, historically, reversed by having started with tanks and gone on to more complicated machines. It is clear that the pendulum is now swinging back again. However, I feel that we must not be over-impressed by local conditions. I notice that he says he does not get significant bacterial counts in his tanks after ten hours in Montreal, with hypochlorite sterilisation between dialyses. There must be a considerable number of people who have used tanks around the world now who could not reproduce this experience. It may be a local phenomenon that they have much cleaner water to start with in Montreal. One of the difficulties in using tanks in areas where you have a heavy bacterial count in the water to start and, if you are particularly unlucky, organisms colonising those tanks which are not susceptible to hypochlorite sterilisation, is that you run into terrible pyrogen problems eventually. This is one of the limiting factors in a re-used tank system. Otherwise, I would agree with most of his remarks.

Unidentified Member: Dr. Kaye, à propos of the more complicated home dialysis equipment. It has been our experience that, for every machine monitoring activity that you give to a human, you have the chance that memory will fail and abundant evidence in the United States indicates that this does occur, with patients forgetting to put the concentrate into the tank system, patients forgetting to rinse the Kiil or other sterilising equipment of formalin or bleach, forgetting to check the blood leak at the beginning of dialysis. We have seen blood leaks occur at the seventh hour of dialysis; admittedly, this is unusual, but it does occur. So the question is, what is more important—$2,000 or a safe haemodialysis? This is a very difficult question to answer at the present time, machines admittedly fail, but, if they fail, they will still not forget to do something.

Kaye (Montreal): I should like to thank Dr. Shaldon for his comments and, in answer to the question, yes, it is quite true that the water is chlorinated quite heavily and it is sterile to start with. All the bacteriological tests I have quoted were done in Montreal. However, only about
half of our patients are in the city: the rest of them are scattered all over the place and I have done very little or no testing in these remote areas and nobody has had any pyrogen reactions. Furthermore, for three years, we ran a very heavily contaminated recirculation system in hospital, with masses of bacteria, without very much trouble. With regard to safety, I certainly agree: I do not think money is the prime question. On the other hand, I think the patients have to be well trained, whatever system they are going on at home—whether it is fully automatic or whether it is a tank. They can mess up an automatic system just as thoroughly as they can mess up a tank. We make sure, as far as we can, that our people are well trained. One device we have introduced which may be of interest is a multiple choice question paper. They get a hundred questions at the end of a two month training period and we expect at least a pass rate of somewhere round 75%. We have found this quite useful: it focusses areas of which their knowledge is incomplete. So I think one can get around this without too much trouble. I might add that we have three adolescents who have been on dialysis for varying periods—over a year in one case. They are all doing very well and the only problem we have is that one was out on daily dialysis for about eight hours a day and the child’s mother refuses to reduce the frequency of dialysis; we think she is being over-dialysed.

Unidentified Member (Berlin): Dr. Kaye, why do you say you use tap water for your tank? I think you will agree that soft water is more important to the patient than to the machines. Is your tap water in Canada so soft that you can use it for the patients without softening it before?

Kaye (Montreal): We do not have water as hard as you have in some places in Europe. None of our water has calcium above 6 mg per cent, which is the level we wish. Therefore, we determine the tap water calcium and magnesium content and we adjust the concentrate so that it ends up at 6 mg per cent. If it was above, then I agree that it would have to be softened.

Cattell (London): Could I return to this question of infection in tank systems, as I think this is the major limiting factor in the tank? Most of us have run into trouble with pyrogen reactions at some time and I think many people probably find as we did that, if you are attempting to eliminate the pyrogen in your system, the bacterial counts in your tanks may be of limited value—you may get poor correlation between your tank bacterial count and your reactions—and the thing that I think ought to be monitored is the bacterial count in the kidney dialysate. That is to say, at the end of dialysis the dialysate coming out of the kidney should be sampled, because it is after all in the kidney itself that the renal multiplication of bacteria goes on during a nine- or fourteen-hour dialysis.

Berlyne (Manchester): Does Dr. Kaye take into account the weight of a tankful of water? It weighs half a ton. Do you deliberately strengthen the floors of your houses, therefore, and how much does this cost?

The Chairman: A double bed with two large people in it is about the same weight, if I could answer this from the Chair.

Berlyne (Manchester): A double bed is spread over a much larger area than this little tank.

The Chairman: Yes, but you can put a plate under the floor to spread this over a large area also, but what does Dr. Kaye have to say about this?

Kaye (Montreal): Well, perhaps we are at a disadvantage because all houses in Canada have basements, whereas I think many in England rest directly on the foundations, but as yet we have had no tank go through the floor.
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RAM (London): We have made studies on the bacterial count in these large tanks. Of course, now we use the proportionating system, but prior to this we did have large tanks. We started with a bacterial count of less than ten organisms per mill at the beginning of dialysis and at the end of twelve hours’ dialysis we had counts of 1000 organisms per cubic millilitre. This we think is acceptable. The precaution is to have a tank in a room separate from the dialysis, so that aerial contamination of the tank water does not occur. The other thing is to have an ultra-violet light system in the circulating part, so that there is a certain degree of bacterial inhibition during the dialysis. The problem, of course, is that one has to distinguish between bacterial growth and pyrogens. Pyrogen reactions could occur although the bacterial growth is well under control. I think these two are certainly separate.

GOMBOS (Washington): We have had two adolescents on chronic dialysis. The first died after two and a half years, the second has been on chronic dialysis for four years now, interrupted by a transplant which functioned for eight months. He has just finished secondary school along with his non-identical twin brother and he beat him in grades: he got honours. Both patients adjusted very well. We used a two-layer Kiil and I should like to ask Dr. De Palma why, since both of his patients weighed between 40 and 45 kg, he felt obliged to use only a single layer of the Kiil when he was practically at adult weight?

DE PALMA (Los Angeles): We used a single-layer Kiil for the first 211 dialyses. Subsequent dialyses have been done with a non-prime two-layer Kiil for those patients exceeding 35 kg in weight. You can remove more weight without compromising the circulating blood volume with the single-layer than with the two-layer with a child, and this is one of the main reasons we started with a single layer.