LONG DIALYSIS: A REVIEW OF FIFTEEN YEARS EXPERIENCE IN ONE CENTRE 1968–1983

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Since 1961 it has been our policy to increase the dialysis time when a haemodialysis patient is not doing well. Technical progress has been made in dialyser design and in dialysis methods; however, it remains our conviction that longer dialysis is still the answer for the patients with problems. In the EDTA Registry annual report presented last year, long dialysis was defined as more than 13 hours dialysis weekly [1]. For the year 1977 the same Registry reported that only 6.2 per cent of centre patients and 11.7 per cent of home patients in Europe received more than 20 hours a week of treatment [2].

In Tassin, in 1983, all patients are still treated for more than 20 hours every week. In reviewing here our 15 years' experience with long dialysis our aim is to remind those who have forgotten it or to teach those who ignore it, the quality, the simplicity and the value of this good first method to which we remain faithful. We await valid reasons and strong evidence demonstrating the better quality of other treatment modalities.

Our cumulative experience with long dialysis consists of 3250 patient-treatment years with an unchanged technique. The total population was 373 patients with 233 presently on dialysis, 208 of them have been treated for more than one year. The residual renal function is less than 1ml per minute in all patients.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Number of patients</th>
<th>%</th>
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<tbody>
<tr>
<td>&lt; 35</td>
<td>91</td>
<td>24.4</td>
</tr>
<tr>
<td>35–44</td>
<td>78</td>
<td>21.0</td>
</tr>
<tr>
<td>45–54</td>
<td>114</td>
<td>30.6</td>
</tr>
<tr>
<td>55+</td>
<td>90</td>
<td>24.0</td>
</tr>
<tr>
<td>Total*</td>
<td>373</td>
<td>100.0</td>
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</table>

* All patients admitted since 1968
Patients were equally distributed among four age groups (Table I) at the start of treatment. They are an unselected population. The important development of transplantation in our area has increased the mean age of the group: half of the present population is more than 55 years old. The distribution of primary renal disease shows no difference from that generally described (Table II).

### TABLE II. Distribution of primary renal diseases – 1983

<table>
<thead>
<tr>
<th>Disease</th>
<th>N</th>
<th>% total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic glomerulonephritis</td>
<td>81</td>
<td>34.8</td>
</tr>
<tr>
<td>Pyelonephritis/interstitial nephritis</td>
<td>28</td>
<td>12.0</td>
</tr>
<tr>
<td>Cystic kidney disease</td>
<td>30</td>
<td>12.9</td>
</tr>
<tr>
<td>Heredo-familial</td>
<td>28</td>
<td>12.0</td>
</tr>
<tr>
<td>Renal vascular</td>
<td>10</td>
<td>4.3</td>
</tr>
<tr>
<td>Multi-system</td>
<td>13</td>
<td>5.6</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>43</td>
<td>18.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>233</td>
<td>100.0</td>
</tr>
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</table>

There are almost twice as many males as females. Fifty patients have dialysed for more than 10 years, 10 of them more than 15 years. Fifty-five per cent of the patients dialyse in the centre while 45 per cent do so at home or in a self-care unit. Thirty patients dialyse twice a week (for 10 or 12 hours) and have done so for more than 10 years. Nearly two-thirds of the sessions are performed overnight.

Diet is free with a liberal amount of protein but a low sodium intake is advocated. The only drugs widely used in our unit are for calcium and phosphorous control. We never transfuse and only three patients are on hypotensive drugs.

The main features of our experience is that our technique has remained unchanged since the beginning. We continue to use standard or multipoint Kil Kidneys, reused only at home six times.

A central dialysate delivery system is used in the centre and our standard sodium is 140mmol/L. The individual equipment at home includes a programmable automatic cleansing and rinsing system, reducing the technical burden for the patients. They can set the day and hour when they propose starting their next dialysis session. We use continuous heparin infusion.

Ninety per cent of the patients use a fistula and when they are unable to have a fistula we prefer the Thomas shunt. Two patients have needled their own brachial artery for two and five years respectively. We have almost no need for vascular prostheses.

Dialysis duration is prolonged: 24hr weekly for the twice and 22hr for the thrice weekly group. We would like to explain the reasons for such a long time spent on dialysis every week.

An important point is the low intradialytic morbidity. We compared the
TABLE III. Intradialytic morbidity – Tassin vs Diaphane

<table>
<thead>
<tr>
<th></th>
<th>Number of incidents per 1000 haemodialyses</th>
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<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Tassin</td>
<td>Diaphane</td>
</tr>
<tr>
<td>Hypotension</td>
<td></td>
<td>34</td>
<td>174</td>
</tr>
<tr>
<td>Cramps</td>
<td></td>
<td>56</td>
<td>106</td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Mean dialyses duration/week (hours ± haemodialysis)</td>
<td>(±1.0)</td>
<td>24.1</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypotension</td>
<td></td>
<td>79</td>
<td>277</td>
</tr>
<tr>
<td>Cramps</td>
<td></td>
<td>76</td>
<td>95</td>
</tr>
<tr>
<td>Vomiting</td>
<td></td>
<td>2</td>
<td>65</td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Mean dialyses duration/week (hours ± haemodialysis)</td>
<td>(±1.9)</td>
<td>23.4</td>
<td>12.9</td>
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frequency of major incidents arising during dialysis with data of a French dialysis registry (Diaphane) (Table III). Hypotension, headache and vomiting are much less frequent during our long dialysis schedule.

Our study was performed on hospital dialysis patients but we know that during home dialysis incidents are exceptional. We think that this is due to smoothness of slow long dialysis and in these conditions time has not the same value.

Post-dialysis tiredness is mild, most patients after treatment have a quick breakfast and then drive their own car to their work. Sleep can be a problem with long dialysis but our visitors are often surprised to see that everybody is sleeping in the dialysis ward, sometimes even the two nurses taking care of the 18 patients are also asleep! A survey on quality of sleep has been performed to which 236 patients responded. Mean duration of sleep was estimated at eight hours nightly for daytime dialysis patients and a mean of 6.5 hours for the dialysis night of overnight dialysis patients. Eighty-six per cent of overnight patients are satisfied with their dialysis schedule.

Comfortable sessions help the patients to come to the treatment without anxiety; this is what we call non-emotional dialysis. This also allows them to take charge of their own treatment which is very important in our philosophy. More than half of centre patients and all home patients insert their own needles, most of them prepare their equipment, perform their tests, set their heparin pump and connect themselves to the artificial kidney machine. Many disconnect themselves at the end of the session.

We established a six point scale to estimate the degree of independence of our centre patients. Criteria for assessing patient’s independence in conducting their treatment were:

- Self needling
- Self care for starting haemodialysis
- Self care for discontinuing haemodialysis
- Self estimation of adequate transmembrane pressure
- Trouble shooting ability
- Knowledge of own biological data
More than half of them score positive for four or more of these criteria. The natural choice for independence is of course home dialysis wherever possible. Another interesting feature in our experience is that in spite of long-term treatment very few blood access problems arise in our population. After 12 years 50 per cent of the fistulas are still in use. We think there are several reasons for that:

1. The high incidence of self-needling
2. Our particular technique of always using the same puncture site for each needle (some patients have used the same site for 14 or 15 years)
3. The length of dialysis allows for correct solute removal even with a modest fistula blood flow.

The long-term acceptance of the programme is good, dialysis patients are generally lively and active. Morbidity is low; in 1982, 40 per cent of the patients did not need hospitalisation, 27 per cent were hospitalised for less than eight days. The mean hospitalisation time for the population as a whole was 9.7 days/year including all medical and surgical problems. Altogether this allowed for a better rehabilitation which we evaluated according to the classes defined by our association. Eighty-three per cent of the home patients and 47 per cent of the hospital patients are back to work.

Until recently, very few patients asked for transplantation as they were satisfied that dialysis provided them with a good physical and psychological condition, and no damage appeared with time. Unfortunately, a new event changed our and their attitude and that is the appearance of the carpal tunnel syndrome after 10 or 15 years of treatment. It was observed in 73 patients, 42 of them were operated on, the mean time between the start of haemodialysis and surgery was 12.6 years. In 75 per cent of these cases a very disabling scapular periarthritis of the shoulder has been observed. Among the patients operated on we found amyloid deposition in 83 per cent. This new pathology is probably not linked to long dialysis per se but reduces presently our optimism about dialysis for more than 10 or 15 years. Today, we tend to recommend transplantation to our younger patients. Transplant team psychologists are generally quite surprised to record the demand for transplantation of these patients dialysing for more than 10 years, satisfied with the method with good rehabilitation but distressed by the shoulder pain they experience or fear for. This change of policy is due exclusively to the appearance of this painful complication and not to dialysis intolerance.

We cannot skip the classical complications of dialysis and we will say a few words about it. No clinical motor neuropathy has ever appeared in our 3250 patient-years experience. We have had to care for eight patients coming from other units with severe neuropathy: five were paraplegic, three tetraplegic. They have all improved with an increased protein intake combined to long dialysis treatment.

We have observed three episodes of pericarditis which all recovered after serious fluid removal. No pulmonary oedema has been seen.

The control of anaemia has been obtained without blood transfusion. Patients
treated for more than one year have a mean haematocrit of about 30. Twenty-six patients constitute a low haematocrit group with a female predominance (19/26) and four of the nine anephric patients. Twenty-seven patients have a high haematocrit including 10 with polycystic kidney disease and only four females.

The mean interdialytic weight gain is less than 2kg. Patients do not complain of thirst. Thirty patients have a weight gain of less than 1kg, their blood pressure is slightly lower than the general mean. Thirty patients (almost all males) gain more than 3kg; their blood pressure is not significantly different from the mean. Generally speaking weight gain is not a problem with long dialysis and we do not need to give dietary restriction. Long dialysis allows for a very complete and easy fluid removal, enabling control of the extracellular volume and the avoidance of hypertension. The mean blood pressure of our patients is 134/80; a hypotensive group includes 17 patients, mostly women, with a mean blood pressure of 86/50. The hypertensive group includes four patients, three of them being the only patients taking blood pressure medication. This good blood pressure control seems to be a most important point for the long-term patient survival.

The overall survival of 373 patients treated since the beginning is 75 per cent at 10 years and 65 per cent at 15 years (Figure 1). If we exclude the 63 high-risk patients because of their initial disease (15 diabetes mellitus, 15 systemic disease 7 malignant disease) or their preceding vascular history (angina and/or myocardial infarction 17, cerebrovascular accident 11, arthritis 4), the survival of these patients is only 50 per cent after seven years of treatment, whereas
the other 310 patients without high risk factors have a 75 per cent survival rate at 15 years.

Curiously, the different age groups do not show important differences in terms of survival except for patients starting dialysis treatment before 35 years of age. This group of 91 patients has an actuarial survival rate of 93 per cent at 15 years.

The annual death rate of 2.3 per cent was compared with EDTA data for the year 1978 for 1000 patients at risk (Table IV) [3]. The difference is in

<table>
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<tr>
<td>Cardiovascular deaths</td>
<td>70.5</td>
<td>8.7</td>
</tr>
<tr>
<td>Infection</td>
<td>14.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Malignant diseases</td>
<td>6.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Therapy ceased/suicide</td>
<td>3.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>14.1</td>
<td>6.8</td>
</tr>
</tbody>
</table>

* According to EDTA classification
† Based on 3213 patient-treatment years

the cardiovascular mortality about 10-fold less in our experience. Infection and malignant disease also appear less frequently as a cause of death in our group. Can we believe that these differences are primarily due to long dialysis which allows for good blood pressure control, a free diet and a physical condition not far from normal?

The overall number of deaths was 75: nine were due to myocardial infarction, seven of them occurred in diabetic patients.

Let us compare the mortality in the year 1981 for patients alive at January 1 (Figure 2) using the same presentation as at the last meeting in Madrid [1]. The difference in mortality rate between short and long dialysis becomes obvious with the extra long dialysis. We had no myocardial infarction this year and the general mortality was the same rate as in our overall experience.

One question arises from our experience: is long dialysis an efficient prevention of cardiovascular complications observed in long-term haemodialysed patients? If it is so, why should we switch to short dialysis?

Anyway, no medical advantage seems to derive from such a change; of course, most patients have heard about shorter dialysis schedules and ask questions about it, but when they are able to perform dialysis during the night they prefer a method free of intradialytic complications which provides them with good physical status. We rather often receive demands from patients to be accepted in our centre for longer sessions or asking us how they could get longer schedules in their own units. We have frequently had the opportunity to treat patients coming from a short dialysis programme and to observe that within a few weeks
the haematocrit rises and the blood pressure comes to normal so that blood pressure medication can be discontinued.

The administrative regulations limiting the number of available stations dictated the trend towards shorter dialysis. We think it is important to draw attention to long dialysis from a purely medical standpoint and to reflect on the real choice.

Dialysis costs are clearly important. For those who fear that long dialysis could be more expensive, suffice it to say that our running cost is the lowest in our country. Rehabilitation means economy, home dialysis is less expensive, and non-emotional dialysis is a strong argument towards home dialysis (50 per cent in our case when the national mean is 18 per cent). Low morbidity and hospitalisation rate save money as well as the lower requirements for medications and routine biochemical tests.

In addition the 13 per cent of patients dialysing only twice a week cost less to society.

The long soft dialysis has remained the only dialysis technique used at our centre. The main reasons for this consistent policy have been:

A low intradialytic morbidity resulting in non-emotional comfortable haemodialysis

Easy control of extracellular volume and blood pressure without hypotensive drugs

Excellent long-term survival

Our overall experience was characterised by a low mortality (75 deaths in...
373 patients). Cardiovascular accidents accounted for only 33.3 per cent of all deaths compared to 70.6 per cent of all deaths among home haemodialysis patients [1].

References


Open Discussion

MION (Chairman) Thank you very much Dr Laurent for your very nice presentation of this unique experience: you are a true exponent of long dialysis and I think that nobody can challenge you in this field. Now both our presenters have stimulated your minds and I hope there are many questions for discussion.

BAILLOD (Chairman) I would like to put one question to both the speakers because I really thought that in working out the quality of dialysis they might mention the problem of parathyroid hormone and whether they needed to perform more parathyroidectomies and whether they could control calcium and phosphate adequately? I would like each speaker to comment on this.

CAMBI Parathyroidectomy was undertaken in 14 per cent of all patients treated in the last nine years. We have checked the dietary intake of phosphate in our cases and we try not to exceed 600–800mg daily. Following the suggestion of the Fournier group, who presented a paper last year at EDTA* we have been substituting calcium carbonate and we are actually eliminating the use of aluminium hydroxide.

LAURENT We have undertaken about 70 parathyroidectomies in our group of patients. We have some patients starting their treatment before 1963 and at that time we did not know how to manage phosphate and calcium. Many patients use phosphate-binders; we have no problems with the long-term intake of aluminium.

NUBÉ (Alkmaar) We have heard this morning about short dialysis and long dialysis, but everyone knows we are using many artificial kidneys with many different clearances. Would it not be better to talk about clearance of solutes per week, instead of the dialysis time?

CAMBI That is an important question, and I do not know the answer. Actually we underline that short dialysis is a word that at present is without meaning and there are other ways of quantifying the dialysis treatment. The title of this session was “Short or Long Dialysis” because the EDTA statistics show an

increased myocardial mortality with short dialysis. I would like to add that my presentation on short dialysis would have been totally different without the failure of the computer facility of the EDTA Registry. I think that it is almost useless to present some statistics about our own population when there are enormous differences in the ages of our patients. How can you evaluate a group of patients over 70 years old dying of myocardial infarction? That is the reason we are considering the possibility of starting again this study by comparing groups of patients selected from the EDTA Registry.

AHMED (Liverpool) I have reduced the hours of dialysis, just out of mercy, in two of our long-term overnight home dialysis patients who had undergone long hours of dialysis. They came back to say that they felt so awful that they wanted to go back to long hours of dialysis. We have also seen the carpal tunnel syndrome in the non-fistula arm. Can I ask Dr Laurent whether he has seen the carpal tunnel syndrome in the contralateral arm to the fistula?

LAURENT We have not seen any relation to the fistula. Some patients had their first carpal tunnel symptoms in the other arm to the fistula and they have never had vascular surgery on that side.

DRUEKE (Paris) I doubt that the assessment of motor nerve conduction velocity alone is a good means of evaluating clinically important uraemic polyno neuritis. I would like to ask Dr Cambi in how many patients did he consider increasing dialysis time, dialyser surface area or both in order to correct or to improve clinically important polyno neuritis?

CAMBI In the last 12 years we have never seen a single case of polyno neuritis. We have seen a group of patients, independent of dialysis treatment, deteriorating without developing the clinical signs of polyno neuritis and then stabilising over four years. At the beginning, in the early 70s, we did change between long and short dialysis but we did not find any difference.

DRUEKE This is very different from our personal experience, and we do not dialyse for shorter times or with smaller surfaces than you. We continue to see cases every year of clinically important, but minor, forms of polyno neuritis.

WALLS (Leicester) I think we would all congratulate Dr Laurent on his very low incidence of cardiovascular mortality. He must have a unique experience in exposing his patients to greater amounts of acetate in the dialysate than anybody else in the world. I wonder if he would like to make any comment about the longitudinal lipid studies that he might have done in his patients to see whether we are chasing an epiphemonon or not or whether this is concerned in the cardiovascular mortality?

LAURENT We did not find any change in the lipids in our patients. We had mean values after five, 10 and 15 years and the values were the same. We always use acetate in all our patients.
KERR (Newcastle upon Tyne) Both authors have presented such wonderful results that I wish we could achieve the same. It suggests to me that perhaps the physician has more influence than the duration of dialysis, but I would like to ask one question of Professor Laurent and one of Professor Cambi. Your results, Professor Laurent, with fistula survival are extraordinarily good in spite of needling in the same place, which in our patients often seems to produce aneurysm; we also have a substantial incidence of excessive fistula flow. Are you using an end-to-side, a side-to-side fistula or some modification that allows your fistulas to survive so long? My question to Professor Cambi: you said that your schedule was so designed that middle molecular clearance must be poor, but I wonder whether that takes account of the recent recognition that middle molecules are largely confined to extracellular space which should make quite short dialysis adequate in removing them?

LAURENT We do assess the fistula and they are side-to-side. I think that one point is that our patients are not hypertensive and this is important for the survival of fistula. We have not seen any aneurysm and the technique of the same site puncture is chosen for the comfort of the patients and to make home dialysis more easy. It is very easy to put the needles always in the same place as there is a channel for insertion and we have not seen aneurysm formation.

CAMBI I cannot answer Professor Kerr’s questions because I think that we have now to follow a different philosophy because now we know that all retained solutes may be toxic. We have to remove them in a way different to that of 12 to 15 years ago. I am not sure that we can state that middle molecules are confined to the extracellular space. We do not know the target of these toxins. I think that the only thing we can say is that we have to remove as many as possible without cardiovascular instability.

ELIAHOU (Tel-Aviv) I think that Professor Laurent has a very unique experience which should not be ignored, but it lacks intra-institutional controlled comparison. May I suggest that Professor Laurent switches his patients to six to 10 hours weekly, i.e. half their present time, for the next two years and then reports the outcome to us?

LAURENT I apologise, but I think that my patients would never accept that.

BARTOVA (Prague) You have mentioned the carpal tunnel syndrome from amyloid deposition. Have you come across any other complication from amyloid deposition in the patients treated by long hours dialysis?

LAURENT Yes, as I mentioned we have seen shoulder pains and we have two cases of bone disease due to amyloid deposition.

RONCO (Vicenza) I would like some information about the diet of Professor Cambi’s patients. We have to deal with a system in which, in association with a rapid removal of solutes, we have a 24-hour production. Do you not think
that the first condition in planning a short dialysis schedule should be a metabolic control to obtain a constant positive nitrogen balance?

CAMBI Of course short dialysis is totally unphysiological while CAPD is very physiological: there is no question that normal urinary function is even better. What we conclude from the metabolic studies we performed, but did not present, is that these patients have a normal nitrogen balance and they are not wasting. Why should we increase the dialysis time, especially when we have the chance of avoiding cardiovascular instability during the course of treatments. I am wondering if it is really correct only to concentrate our attention about dialysis and cardiovascular instability, because in order to do that we should have clean statistics. We should clean the statistics of EDTA that last year presented patients treated for 1–13hr/week and for 14–40hr/week and also this year they are considering patients between 8–12hr/week. This can be done, but the other point is that if dialysis is adequate in social terms and in terms of cost I would like to ask the long dialysis people how many patients per million are being treated: if you are able to treat 500 patients per million I am happy.

LAURENT I think that one point with long dialysis is that it is the most easy way to establish patients on home dialysis. If you want to treat many patients per million I think it is very important to have a very easy method of converting them to home treatment.

ZAZGORNIK (Vienna) What was the frequency of uraemic pericarditis in your patients on short and long dialysis treatment?

CAMBI Unfortunately I do not have any figures, but what we notice is that sometimes there are epidemics of pericarditis, maybe once every two or three years. I think this is probably virus dependent and not dialysis dependent, but this does not worry us as much as clinical neuropathy.

LAURENT I reported in my paper that for the 3,000 patient-years experienced we have had three episodes of pericarditis.

PAPADIMITRIOU (Thessalonika) If I understand Dr Laurent correctly, 10 per cent of your deaths are due to car accidents. If this is right, do you have autopsies from these patients as some of your patients who died during the car accident may have had a myocardial infarction immediately before.

LAURENT No, in many cases they were not themselves driving and they were involved in very big accidents. I think it is because patients are travelling for many kilometres to go to the Unit. The statistics of Insurance Companies show that there is one death every million kilometres. We calculated the number of kilometres for the patients to come to the Unit was eight million kilometres. We are, therefore, in the statistics of kilometres.

CAMBI You are saying that they are travelling many kilometres. Isn’t this an
indication of inadequate facilities because of long dialysis hours? Once again, how many patients per million are you treating in your area?

LAURENT In our area there are many patients treated, because we started with Professor Traeger in 1960 the treatment by dialysis for chronic patients. At the beginning there were no dialysis facilities in a very large area and some patients came from 200 or 300 kilometres away. Some for personal reasons could not have home dialysis.

NAGA (Alexandria) Could I ask about the incidence of pruritus during short term dialysis and the best way of management?

CAMBI Pruritis is a problem associated with hyperparathyroidism, and we noticed that only some of the patients with secondary hyperparathyroidism presented with pruritus. Of course pruritus may also be iatrogenic if we make mistakes with Vitamin D therapy, but I cannot give you numbers.

LAURENT Pruritus was a reason for increasing dialysis in some patients. I think pruritus due to hyperparathyroidism is very different to the pruritus of insufficient dialysis. When symptoms occur in the warmth and during the night in bed we increase dialysis and the symptoms improve.

WAUTERS (Lausanne) I would like to ask Dr Cambi on which data is based his statement that three times four hourly is adequate and three times three hourly inadequate treatment?

CAMBI We noticed, only on a clinical basis, that the majority, I will say 100 per cent, were in a safe condition considering the result in terms of survival with four hours. I stress once again that talking about timing in 1983 is totally meaningless because we have to talk about several other problems related to the removal and to the treatment. I totally agree that we may reach different dialysis duration but also with different modalities of treatment.

FUNCK-BRENTANO (Paris) I wonder if the actual challenge is between short dialysis or long dialysis. I believe that the real challenge is between good dialysis and bad dialysis. It might be easier to promote a good dialysis with a long procedure because all the changes are going slowly. This does not mean that short dialysis cannot be good. General comparisons between the two methods are in fact inadequate. Each method must be adjusted according to the patient’s will and benefit. Each method has to be tested in terms of medical adequacy and economical adequacy. So the results might be different in different countries.

SODENSTROM (Stockholm) I wonder how many of your patients used single needle versus double needle monitors?

CAMBI No, we do not regularly use single needles. We are very perplexed con-
sidering what type of renal substitution treatment we are going to follow. We anticipated that we would need a high blood flow, much higher than 300ml/min and the problems of recirculation with single needles may be very dangerous associated with short dialysis.

LAURENT We never use single needle systems.

BAILOD I would like to make a comment about the fact that Dr Laurent has introduced a problem that I think people who have had patients on dialysis for 15 years plus must be getting very worried about. It is the problem of the carpal tunnel syndrome followed by the shoulder joint pains followed by the stiffening hands and patients with low blood pressures, all of which may be due to amyloid. Although when I have asked our histologist to prove amyloid they have not always been able to do so. I think that this is an area that unfortunately Professor Cambi did not talk about: patients in the 15 year group with this problem. Perhaps later on we will know whether short dialysis avoids this problem. It is not so much the mortality and the death of patients but the morbidity that these patients have to live with when they are untransplantable. This is painful for them and for us to observe.

MION I think that this is a very important comment.

BRYNGER (Göteborg) Patients are very different in protein intake and bodyweight. Do you consider this in using different dialyser clearances or blood flows?

CAMBI This is another difficult question to answer, because we can just say that they are in a steady state and that means that the balance between what they need and their intake is correct. The protein intake of my patients is around 1 gram per kilogram body weight.

FIRBANK (Belgium) When comparing short and long dialysis schedules I think it could be important to know the patient’s residual renal clearance. Professor Laurent mentioned it was less than 1ml per minute. Perhaps I missed it, but could I ask Professor Cambi for his data on that point?

CAMBI Yes. I did not mention this because I thought it was clear that after 12 years 90 to 95 per cent of the patients are almost anuric.

WIZEMANN (Giessen) We have identified overhydration as a major risk for coronary perfusion. I would like to ask both speakers what are the weight gains of your patients in the interval between dialyses?

LAURENT I would say that weight gain between dialyses was a mean of 2kg with 30 patients having less than 1kg and 30 patients with more than 3kg.

CAMBI We just evaluated and presented this morning the interval weight
gain in the patients dying from myocardial infarction and this was 3.1 per cent.

ANDREUCCI (Naples) Our patients are always asking for shorter dialysis, so I think that it is not only the problem with the patients whether they want a long dialysis, as Guy Laurent is saying, or a short dialysis: it depends on the doctor. If the doctor suggests a short dialysis they will do even shorter and shorter as they are always asking for shorter dialysis. I am sure that even if most of the participants listening to this discussion seem to be close to what Dr Laurent is saying, I think that most of the people here are using schedules similar to those of Dr Cambi.

LAURENT We must always believe in what we do.