Dear Sir,

Hypersensitivity reactions have been described in relationship to hemodialysis procedures. The main substances reported as implicated in these reactions have been: ethylene oxide [1, 2], formaldehyde [3], and Cuprophan [4]. Hanai et al. [5] reported a case of anaphylactic reaction, asthma and eosinophilia related to acetate dialyzate. We want to describe a quite similar case:

J.V., a 35-year-old female with end-stage renal disease due to reflux nephropathy. She began a regular hemodialysis program 5 years ago. During this period she did not present major problems. She denied allergic antecedents as well as respiratory complaints.

Five minutes after the initiation of a hemodialysis, she felt generalized itching, chest discomfort, breathlessness, paresthesia in lower limbs, and on examination showed hypotension and disseminated wheezing. These symptoms improved after turning off the dialyzate delivery.

Inquiries into dialysis supplies verified that there had been no changes in the past year (table I). She was taking aluminum hydroxide, 25-hydroxycholecalciferol and multivitamins. An increase in eosinophil counts in the last 3 months was observed (total eosinophil count was 600–700 mm$^3$). In the next dialysis she developed an anaphylactic shock with glottis edema. To obviate the Cuprophan membrane she was transferred to a hemo-filter using a cellulose acetate membrane and acetate as a replacement buffer, but in the first minute of acetate infusion she began to complain of the same symptomatology. Thus, we thought of an acetate as a possible etiologic agent and it was replaced by lactate. With this change the patient showed a good tolerance to hemo-filtration, but after that time, she began to complain of asthmatic attacks at home, which occurred mainly on the days when she had to dialyze. The following month, the laboratory data showed strong rise in eosinophil count as well as a high serum IgE level (fig. 1). Other causes of hypereosinophilia were discarded. Using the same dialyzer and potting material sterilized with gamma rays failed to improve the symptomatology. Thus a broncho-dilator therapy was prescribed.

The subsequent evolution (17 months) was characterized by an increase in the frequency of asthmatic attacks, rise in eosinophil counts and IgE level (fig. 1), and chest X-rays disclosed diffuse reticulonodular infiltrations throughout the lung (fig. 2). This progressive deterioration
made us restate the problem and we took the cellulose acetate into account. The patient was again transferred to hemodialysis using a Cuprophan membrane.

Table I. Dialysis supplies and clinical responses

<table>
<thead>
<tr>
<th>Dialyzer</th>
<th>Sterilizer</th>
<th>Blood tubing</th>
<th>Dialyzate</th>
<th>Heparin</th>
<th>Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuprophan, hollow fiber</td>
<td>Cellulose, acetate plate</td>
<td>Cellulose, acetate plate</td>
<td>Cellulose, acetate plate</td>
<td>Cuprophan</td>
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</tbody>
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All dialyzers were rinsed with 2 liters of 0.9% saline solution. ETO = Ethylene oxide; PVC = polyvinylchloride.

Hypersensitivity Reactions Related to Acetate Dialyzate and Cellulose Acetate Membrane

1 5

Time, months

Fig. 1. Eosinophil counts and serum IgE levels along the patient’s evolution and their relationship to dialyzate.

and bicarbonate dialyzate without acetate (table I). This change resulted in a dramatic fall in eosinophil count and IgE level (fig. 1). The asthmatic attacks subsided, which enabled us to withdraw the bronchodilator therapy in 2 weeks.

In order to confirm the acetate effect on this patient, a blind bronchial provocation test was performed, using 3 different isotonic solutions with 35 mEq/l of bicarbonate, 35 mEq/l of lactate and the same concentration of acetate, respectively. Bicarbonate and lactate inhalations did not produce any symptomatology, whereas after acetate inhalation she felt tightness of the chest, severe cough, dyspnea, wheezing and hypotension that required intravenous corticosteroids. Furthermore, by mistake the patient was dialyzed against acetate once again, where she developed the same clinical manifestations of an anaphylaxis in the first minute after the start.

Six months later, the patient was free of symptoms, the eosinophil counts were 500–700 mm$^3$ and IgE level was 160 IU/ml (fig. 1); however, chest X-ray findings were not modified. The patient refused a pulmonary biopsy.

This case illustrates a close relationship between acetate and the allergic state in a hemodialysis patient. Although we did not perform an ethylene oxide RAST in this patient, we think that it was reasonably discarded as etiologic agent. Actually, we do not know how acetate can act to precipitate a hypersensitivity reaction, but we think that due to widespread use of acetate over all dialysis units, and, since this undesirable secondary effect has scarcely been described, it is more likely that acetate may act as an unusual allergen than through a toxic or irritant effect. Further studies are needed to determine the role of acetate in the development of hypersensitivity reactions linked to hemodialysis.

References