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THE CLINICAL SIGNIFICANCE

OF

CERTAIN ELECTROLYTE DISTURBANCES

A thesis presented for the degree of M.D. of the  
University of Adelaide

by

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## GENERAL SCOPE AND AIM OF THE THESIS

The research on which this thesis is based was carried out during the tenure of a full time surgical research appointment on the Staff of the Institute of Medical and Veterinary Science to work in the wards of the Royal Adelaide Hospital.

The thesis embodies the study and investigation of 125 cases of electrolyte disturbances and particularly those associated with certain forms of shock.

It is claimed that this thesis represents an original and substantial contribution to medical knowledge for the following reasons:

1. In addition to the historical introduction an extensive review of the physiological factors governing water and electrolyte metabolism is presented from the various aspects of particular interest to the clinician.
2. The various syndromes of electrolyte disturbance are dissected from the clinical and biochemical standpoints and principles of treatment have been formulated with illustrative cases. The importance of an adequate understanding of intravenous therapy is stressed. Whilst more cases have been studied, the thesis is based upon the detailed investigation of 125 cases.

3. The recently reported syndrome of hypokalaemia and hypochloraemia is compared with an unreported syndrome arising in less severe disturbances in which there is hypokalaemia without hypochloraemia.
4. The importance of electrolyte excretion after both uncomplicated and complicated abdominal operations was investigated and the fluctuations of potassium, sodium, chloride and nitrogen excretion were determined in a number of post-operative cases.
5. The place and value of the various laboratory methods in the management of these patients are outlined.
6. From experience gained, the factors which should govern administration of potassium ions are simply laid down in this way for the first time.
7. The place of urinary chloride estimation and its correct evaluation are described for the first time in the light of detailed investigations carried out.
8. The principles underlying management of intravenous therapy are described in detail on the basis of experience gained in the management of these patients with electrolyte disturbances.
9. An original method for the sampling of blood for serum potassium estimation is described.

10. A clinical investigation into the place of Dextran as a plasma substitute has been conducted, and its value for the rapid relief of certain types of shock has been established. The need for colloid administration in patients with intestinal obstruction associated with severe shock, is reported for the first time. Some evidence is presented that the effect of the intravenous infusion of Dextran is to depress the serum globulin rather than diffusely influence serum proteins as a whole. This, as far as is known, has not been previously reported.

In submitting this thesis I wish to state that it is entirely my own composition and has been written specifically as a thesis for submission for the degree of M.D., in the University of Adelaide.

I have acknowledged in the bibliography the extent to which I am indebted to others, and I have also indicated those from whom I have received assistance.