Letters to the Editor

Waters of the Swamp

Dear Sir:

Abbott, Baxter and Cutter are the principal suppliers of parenteral fluids in the United States. All proffer a bewildering array of solutions with a variety of names for similar fluids of complex composition. These "plasmalytes," "polyionics," "ionosols," "polysols" *ad infinitum* would cause nightmares in a lexicographer were he kind enough to consider them seriously. A large fraction of these solutions have been manufactured and distributed in response to requests from one or another physician advocating his own particular system of fluid therapy.

"Ringer's solution" is a typical example of such complex solutions. Its active ingredient is isotonic saline (which sells for appreciably less). It contains also salts of potassium and of calcium in concentrations far too small for purposes of treatment but which may contribute to toxicity if plasma potassium or calcium are already high. The physiologic nature of this solution was demonstrated about seventy-five years ago by Sidney Ringer's classic experiments showing its sustaining properties for the isolated, perfused frog heart. Is it reasonable to arbitrarily transpose Ringer's observations to problems of parenteral fluid therapy?

A more sophisticated variant is "Lactated Ringer's solution." This contains lactate in therapeutically effective concentrations in place of a portion of chloride but is otherwise identical with plain "Ringer's solution." Objections to this solution concerning potassium, calcium and price are, therefore, those already mentioned since the active ingredients are sodium chloride and sodium lactate (potential bicarbonate). Moreover, a review of the offerings of leading manufacturers discloses the unfortunate fact that each sells at least fifteen separate solutions containing one or several solutes in concentrations too small to be therapeutic but large enough to contribute to toxicity in predisposed patients. Ions in question are potassium, calcium, magnesium and phosphate.

The utility (in selected patients) of complex solutions, *containing therapeutically effective concentrations* of electrolytes, is beyond question. This need can be met rationally by adding desired quantities of components to simple solutions such as 5 or 10 per cent glucose, distilled water or isotonic saline solution. Thus the physician can specifically prescribe complex solutions without the hazard of forgetting the precise composition of a given commercial, premixed solution. Of the dense jungle of complex, premixed electrolyte solutions, there is an interesting continuum of ion concentrations from zero to high ones. This is silent testimony for individualizing the fluid prescription. *The hospital-mixed, tailor-made complex solution helps insure that the individualized fluid prescription is rooted in reflective thinking.*

Paradoxically, the gain in patient care probably represented by intelligent use of a combination of simple solutions plus purchased concentrates of ions for addition has no counterpart in immediate monetary returns: Premixed, commercial complexes are significantly (25 to 50 per cent) cheaper than hospital analogues even if the window-dressing of low concentration solutes is omitted. Considerable saving can be effected, however, by the use of simple glucose and salt solutions in situations such as short-term maintenance therapy during or after surgery instead of complex solutions containing insignificant amounts of other solutes.

Optimal prescription of parenteral fluids is inextricably linked with assessment and treatment of underlying illnesses, the clinical history, physical findings, serial measurement of body weight, accurate and quickly available laboratory results, and reliable estimates of

intake and output. Tendencies to neglect one or more of these foundations of fluid therapy in favor of a kind of roulette-wheel guidance are shockingly prevalent.

This letter is not intended to provide the detailed background necessary for prescription of parenteral fluids. Valuable guidance is available among the following: Welt's "Clinical Disorders of Hydration and Acid-Base Equilibrium" (Little, Brown & Co., 1959); certain practical points are concisely covered in Conn's "Current Therapy" (Saunders), 1960 (pp. 257–268) and 1961 (pp. 258–270); and theoretic foundations are promulgated in Wolf's "The Urinary Function of the Kidney" (Grune & Stratton, 1950).

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Teaching and Training in Nutrition

Dear Sirs:

In commenting on the excellent editorial written by Dr. Paul György* concerning medical education in the field of nutrition, I would like to make the following suggestions:

I agree with the principle that one member of the medical faculty with special interest and proved accomplishments in the nutrition field, should be named as coordinator of nutritional teaching. However, I believe that a further step is desirable in most of the larger institutions, particularly in those in which there is an opportunity for postdoctorate and graduate research and training. I believe there is a distinct advantage in having a formally designated department or special chair of nutrition, so that within the institution and among those who are outside the immediate organization, the person in the leadership position will be continually identified. For example, I believe that Harvard University and M.I.T. programs demonstrate the value of this type of organization.

At the University of California a similar development is now established, and at Vanderbilt University Dr. Derby's program has been highly successful. The School of Nutrition at Cornell University has made a notable contribution, but they have been handicapped to some degree by the great distance between the main campus for graduate work and the Medical College. At Columbia University, the Institute of Nutrition Sciences has also established an excellent program of coordinated teaching and research.

When there is not a distinct department or school of nutrition, I believe there should be at least a joint designation, such as biochemistry and nutrition. Strong and well identified leadership, when properly staffed, serves as a stimulus and reliable guide among fellow staff members on a voluntary basis, instead of acting as a break on nutritional research and teaching.

In the so-called developing countries, there is usually a need to develop the whole scope of coverage, including agricultural extension, community development and related facilities, as indicated by Dr. György. These are services that we tend to take for granted in the United States and other technologically advanced countries, but even here they do not have the coordination that we need with the medical and health provisions. Fortunately, the United Nations agencies are also recognizing the urgent need for such broad coordination to make the best use of their total resources on behalf of the developing countries.

Dr. György's emphasis on the need for extensive professional training for leadership within the developing countries is well stated and extremely important. Likewise, the emphasis given to the spirit of service and humility in working among professional and lay groups resident in the developing countries is thoroughly commendable.

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