STUDY REPORT

Title: Fluid Compartmentalization in the Nephrotic Syndrome

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Objective To determine the contribution of alteration in fluid compartmentalization in the pathophysiology of the nephrotic syndrome and to determine if changes in fluid compartmentalization can be used as indicators to the response of steroid therapy.

Description Alterations in body fluid compartmentalization are thought to contribute to the pathophysiology of the nephrotic syndrome. The presence of edema which at times progresses to massive anasarca is considered as clinical evidence that the E.C.F. is overexpanded. It is not known if the intracellular fluid is also increased nor have the suspected changes in E.C.F. been documented.

Blood volume studies which have been performed in this condition have yielded confusing results. In some series the blood volumes are reportedly increased or normal, while in most series a decreased blood volume has been noted. Variations in the stage of the disease at which these studies were performed may account for this confusion. The purpose of this prospective study is to determine body fluid compartments at predesignated intervals i.e. prior to therapy, and one month, two months, and six months post–therapy in order to answer the following questions:

1. Is the clinical impression that E.C.F. expanded is correct, and, if so, to what degree?
2. Does intracellular water also increase or, since the nephrotic synrome is characterized as a hypercatabolic state, does it actually decrease?
3. What changes occur during therapy? E.C.F. is suspected to decrease once a diuresis occurs, but the changes in I.C.F. are totally obscure.
4. What are the changes in blood volume, and both plasma volume and red cell mass? Do variations occur during the course of the disease, and what is the relation of the changes which may occur to therapy? The following fluid compartments are measured in this laboratory using methods that have previously been published.

Total Body Water	—	Tritium Space
Extracellular Fluid	—	S_{35} Space
Intracellular Fluid	—	Calculated as TBW–ECF
Red Cell Mass	—	Cr_{51} tagged RBC
Plasma Volume	—	Radioiodinated serum Albumen (RISA)
Total Blood Volume	—	Calculated as sum of RCM + P.V.

Patients admitted to this study are those who have the nephrotic syndrome with the diagnosis established according to the following criteria:

a) heavy proteinuria-i.e. greater than 3.5 grams per day.
b) oval fat bodies and double refractile fat bodies in their urinary sediment.
c) the presence of edema, hypoproteinemia and hypercholesterolemia.

Progress A total of eight patients have been admitted to the study to date. The baseline data on fluid compartments determined prior to steroid therapy are compiled in table 1.

In five patients studies have been repeated after a month of steroid therapy and the net changes for this group are as follows:

TBW	—	6.47 liters (— 2.4% Body weight)
E.C.F.	—	4.84 liters (— 5.4% Body weight)
I.C.F.	—	1.63 liters (+ 4.0% Body weight)
R.C.M.	—	2.2 ml
P.V.	—	49 ml
T.B.V.	—	51.2 ml

The decrease is in Total Body Water and E.C.F. There was a slight decrease in red cell mass, plasma volume and total blood volume. Since these changes are small compared to the total volumes in these patients, they are not significant. It would appear then that there was not a significant change in blood volumes during the initial therapy with steroids.

The changes in total body water and E.C.F. represent a significant decrease in these volumes. It is of interest that although there was an absolute decrease in I.C.F., when expressed as percent of body weight there is an increase of 4%. This may reflect that, concomittant with steroids, there was a comparative increase in lean body mass in this small group of patients. This suggests that as these patients improve during therapy they become anabolic despite the catabolic effect of steroids. The available data do not permit more than preliminary interpretation and further work is required.

Table 1

Name	RCM		PV		TBV		TBW		ECF		ICF	
	Total	cc/Kg	Total	cc/Kg	Total	cc/Kg	Total	%	Total	%	Total	%
Miss Nit	1321	22.4	2266	38.4	3587	60.8	33.525	56.8	13.075	22.2	20.450	34.6
Mr. Prapan	1047	17.9	2721	46.4	3768	64.4	35.841	61.3	17.074	29.186	18.767	32.1
Mr. Pin	1251	20.2	2266	36.5	3517	56.7	37.926	61.2	15.272	24.6	22.654	36.5
Mr. Hor	1183	17.8	2424	36.5	3607	54.2	41.542	67.0	12.858	19.3	28.684	43.1
Mrs. Payao	687	13.2	2460	47.3	3147	60.5	28.763	55.3	9.901	19.0	18.682	36.3
Mr. Chumpon	1930	32.4	2411	40.5	4341	72.8	37.254	62.6	10.007	16.818	27.247	45.7
Mr. Sanarn	1542	21.4	3074	42.7	4616	64.1						
Mr. Chong	1234	18.6	2501	37.6	3735	56.2						
Mean	1274.3	20.5	2232.1	39.5	3790	61.2						