《招待講演》

Nuclear Medicine's Role in Assessing of Renal Function in Organ Transplantation

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The kidneys risk damage almost always after organ transplantation procedures. This damage may arise from the nature of the primary illness itself (cardio-renal syndromes, hepatorenal syndromes, etc.) or the possible nephrotoxic effects of the drugs used in the various anti-rejection regimens, notably cyclosporin and FK-506.

Because the investigative tools of Nuclear Medicine are accurate, safe, non-toxic, non-invasive, relatively easy to perform and well accepted by patients and because the use of these nephrotoxic agents is becoming more and more widespread it is very important that Nuclear Medicine personnel become adept in performing such procedures and improve their interpretative skills.

Nuclear Medicine has a large number of tests of renal function to offer—quantified both *in vitro* or *in vivo*. These include various types of cin-escintigraphy, (*in vivo*) alone or in combination with the *in vitro* determination of effective renal plasma flow (ERPF), glomerular filtration rate (GFR) and the glomerular filtration fraction. Often these *in vitro* functions are performed without scintigraphy.

Since we physicians are often confused about the proper choice of radiopharmaceuticals DTPA or iothalamate for GFR aspects, or MAG 3 or orthoiodohippurate for ERPF aspects, the indications and choice of the various radiopharmaceuticals will be discussed. Particular emphasis will be placed on those Nuclear Medicine tests of renal function that have already established an important niche in the new discipline of transplantation medicine. At the University of Pittsburgh some renal function procedures have become the most commonly ordered nuclear medicine test—as many as 30 per day.

From this experience we have chosen to discuss particularly the following groups: 1. Patients before and after cardiac transplantation prior to cyclosporin therapy. 2. A series of endstage liver disease patients prior to liver transplantation 3. A group of liver transplants after transplantation on FK-506 therapy and 4. A group after cyclosporin therapy. 5. A group of kidney transplants.

FK-506 and Cyclosporin may attack the kidney in different ways. In general they may diminish the total blood (or plasma) flow to the kidney and or they may effect the filtering membrane. The diminution in ERPF is indicative of a decrease in functioning tubular mass. In general, the latter glomerular effects are of two types: an increase in FF indicating a "leaky" membrane (hyperfiltration) or a decreased FF indicating a "plugged" filter.

The various combinations of the above possibilities are associated with different clinical entities and result in different scintigraphic patterns that correlate with various disease processes. Examples of these patterns will be displayed and the correlations of *in vitro* and *in vivo* data will be discussed.

Since FK-506 and cyclosporin have shown their ability to block antigen/antibody reactions, they are being tried in many autoimmune states. Preliminary data suggest definitely beneficial results on diseases involving the skin, thyroid, synovia, islet cells, and kidney. We have compared the toxic renal side effects of cyclosporin and FK-506 in some of these states and shall present our preliminary results.