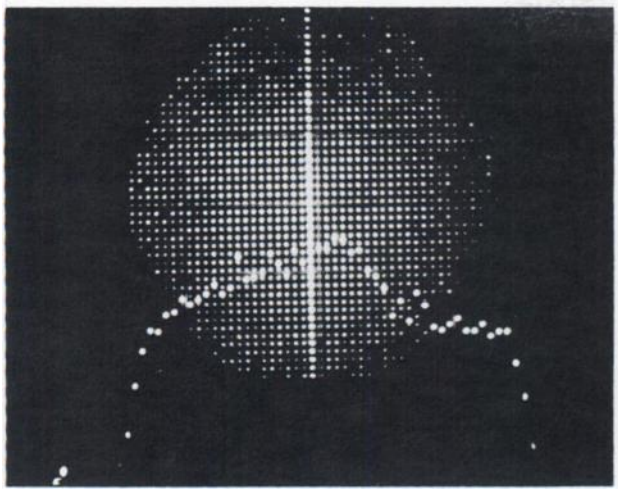

FIG. 2. Histogram taken across crystal face of image created by ^{57}Co flood source through pinhole collimator showing lack of uniformity across crystal.

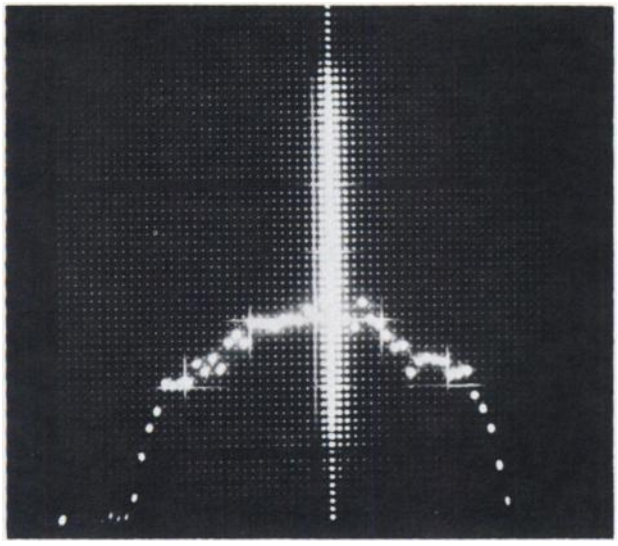

FIG. 3. Image of uniformly linear source as presented on face of 4,096 computer. Linear histogram obtained through center of source across face of crystal is represented by curve which shows dramatically fall-off in activity toward periphery.

when the pinhole collimator was used. He mentions a "brightness reduction" with increasing depth of source in his test phantom. However, he does not mention the problem of increasing center "brightness" for a planar source.

Our studies indicate that the pinhole collimator produces center-of-picture brightness making relative radionuclide "uptake" evaluation in bone imaging difficult. The 38% increase in edge-to-center measured radioactivity correlates with the inverse-square relationship for a collimator as described. This physically generated nonuniformity across the field of view with the pinhole collimator is apparent with all of the radionuclides currently used in nuclear medicine and at all distances from the collimator pinhole front face.

This problem of inverse-square nonuniformity can be overcome by placing the source to be imaged in an arc converging toward the collimator on an equal length radius to the pinhole. This correction is obviously difficult to obtain when imaging the spine in a posterior view. Laboratories with computer capability can correct for this nonuniformity in the final image. We have overcome the nonuniformity problem at our facility by using the rectilinear scanner for bone imaging with ^{18}F.

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^{51}Cr-EDTA BIOLOGICAL HALF-LIFE AS AN INDEX OF RENAL FUNCTION

Since its introduction by Garnett, Parsons, and Veall in 1967 (*1*), ^{51}Cr-EDTA has proved to be a clinically useful radiopharmaceutical for the measurement of glomerular filtration rate particularly when used in the single injection method (*2,3*). The use of glomerular filtration rate as an index of renal function can, however, be considered to suffer from two drawbacks. First, it is dependent on body size or more exactly to extracellular fluid volume, and second at low levels of GFR relatively large percentage changes in renal function show up as small absolute changes in GFR.

Thus a large man can lose a considerable degree of renal function, dropping his GFR from 180 to 90 ml/min, and still remain within commonly accepted normal limits. In addition, a drop in GFR from 40 to 30 ml/min represents a 25% fall for an absolute change of only 10 ml/min.

We have determined the biological half-life of ^{51}Cr-EDTA in 34 patients in whom GFR determinations were carried out by the single-injection technique and correlated these against GFR corrected to a standard surface area of 1.73 m^2 as calculated from a duBois nomogram (*4*). Figure 1 shows the

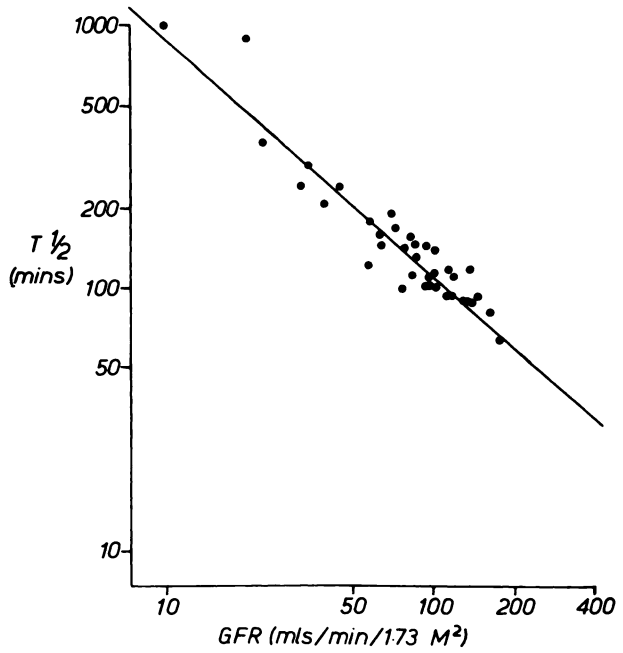

FIG. 1. Log-log plot of ^{51}Cr-EDTA biological half-life in minutes as a function of GFR/1.73 m^2.

relationship between these two parameters using a log-log plot. A high degree of correlation was obtained ($r = 0.945$).

We wish to suggest the use of the biological half-life of ^{51}Cr-EDTA, or of similar filterable substances, as an alternative to glomerular filtration rate for assessing renal function on two grounds: (A) this measurement is entirely independent of body size and thus no corrections are required on this accord; (B) the rapid increase in biological half-life at low glomerular filtration rates highlights important, albeit small, changes in GFR in subjects with poor renal function.

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CHEMICAL STATE OF TECHNETIUM

In a recent article, "Chemical state of ^{99m}Tc in biomedical products" (*J Nucl Med* 12: 596, 1971) the authors, Eckelman, Meinken, and Richards, conclude that "the technetium is probably reduced and chelated as a cationic species". They further conclude that "solutions of ^{99m}Tc compounds should be prepared oxygen free." Neither of these conclusions are supported by the experimental data presented in the paper. No evidence was presented to indicate a cationic species of technetium. The alleged primary supporting evidence of a reduced form of technetium was adsorption of a portion of the ^{99m}Tc activity from a ^{99m}Tc-Fe-citrate complex to Sephadex G-25. The authors did not perform a chemical analysis of the total Fe-citrate complex eluted from the column and compare it with the initial amount added to the column. Therefore it is possible that the column-bound ^{99m}Tc activity was bound to Sephadex as a complex and not as reduced technetium. Conrad and Schade have reported retention of iron-ascorbate complexes, pH 7.5, on Sephadex G-25 and reported increasing amounts of ferrous iron precipitated from ascorbate solutions between pH 6 and 9 (*Gastroenterology* 55: 35–45, 1968). It is conceivable that some of the bound complex or the precipitated iron retained by the column would also retain some ^{99m}Tc and account for the noneluted portion reported by Eckelman, et al. The fact that technetium becomes bound to Sephadex does not necessarily prove a reduced form. One might also question why, if a metal ion species is not necessary for efficient tagging as suggested by the authors, yields higher than 55% of tagged product were not achieved when the HCl/HI reducing agent was used alone (see Table 4). Yields in excess of 90% are achieved using metal ions under reducing conditions. It is apparent from the information in Table 4 that a reduced form of technetium alone does not produce high-yield complexing. Perhaps the authors have some unpublished information to support their statement that "This method of technetium incorporation argues against a metal pertechnetate complex."

The conclusion regarding the preparation of a product in the absence of oxygen is not justified by the data in Table 3. There is very little difference in either set of experiments. In some cases the products appear to get better with storage both in air