# Dose Infiltration Simulating Prolonged Parenchymal Retention of Radiotracer: A Technique Artifact

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Failure to achieve an adequate bolus injection of radionuclide may simulate poor parenchymal uptake by the organ of interest. Parenchymal tracer content is directly related to plasma tracer concentration, the rate of tracer clearance, and the dwell time (transit time) of tracer within the parenchyma (*1*). Since the clearance rate and transit time do not vary during any particular study, parenchymal content is most dependent on the changing momentary plasma concentration; in fact, parenchymal tracer content parallels plasma tracer concentration after the leading edge transit has occurred (*1*).

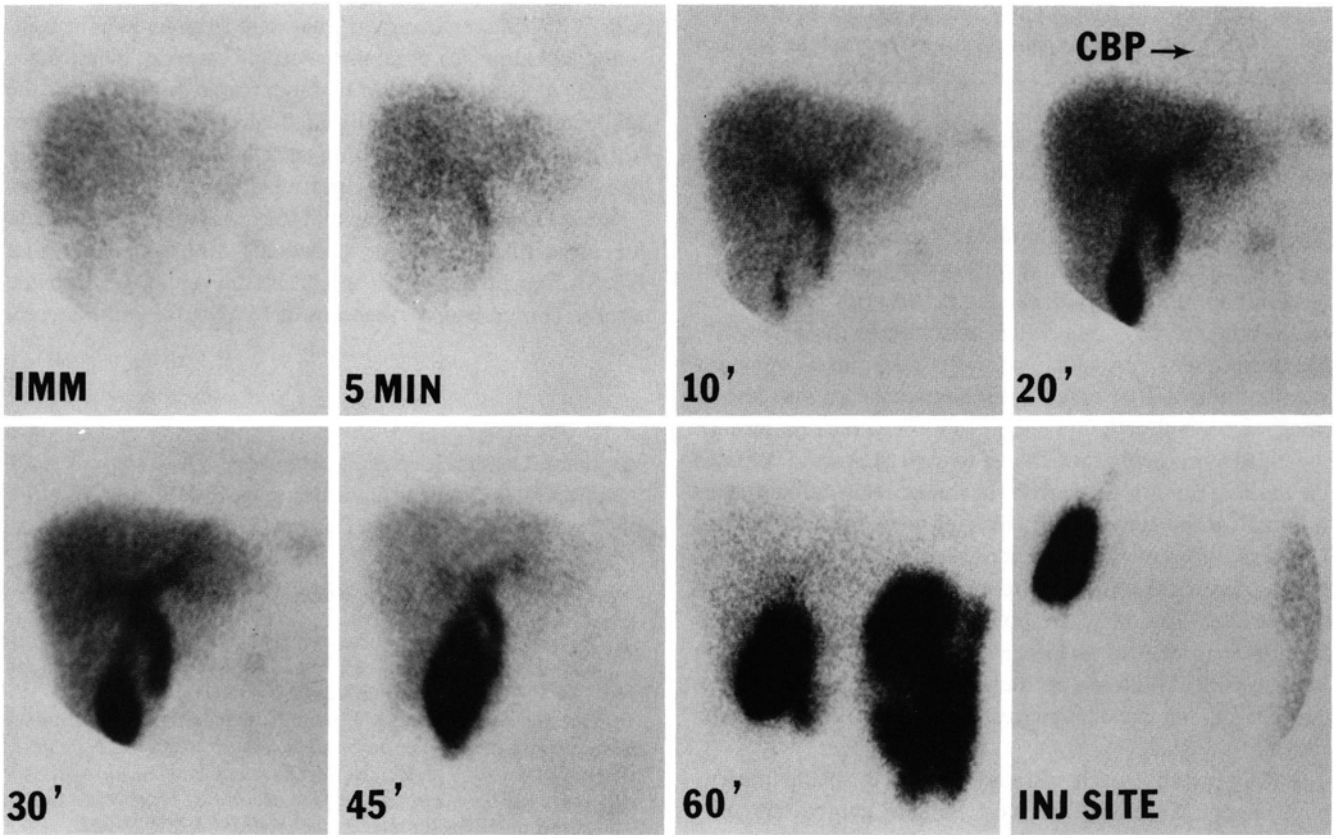


**FIG. 1.** Anterior images of hepatobiliary scintigraphy with infiltrated tracer. Because the majority of the dose was injected subcutaneously and is absorbed slowly, plasma tracer as evidenced by the cardiac blood-pool (CBP) activity, rises slowly, peaking 20 min into the study. Hepatic parenchymal activity continues to rise until the 20th minute of the study, paralleling CBP activity. Then as plasma tracer concentration begins to fall, hepatic parenchymal tracer content similarly falls.

Although persistent cardiac blood pool (CBP) activity and increasing hepatic tracer content might lead one to the inter-

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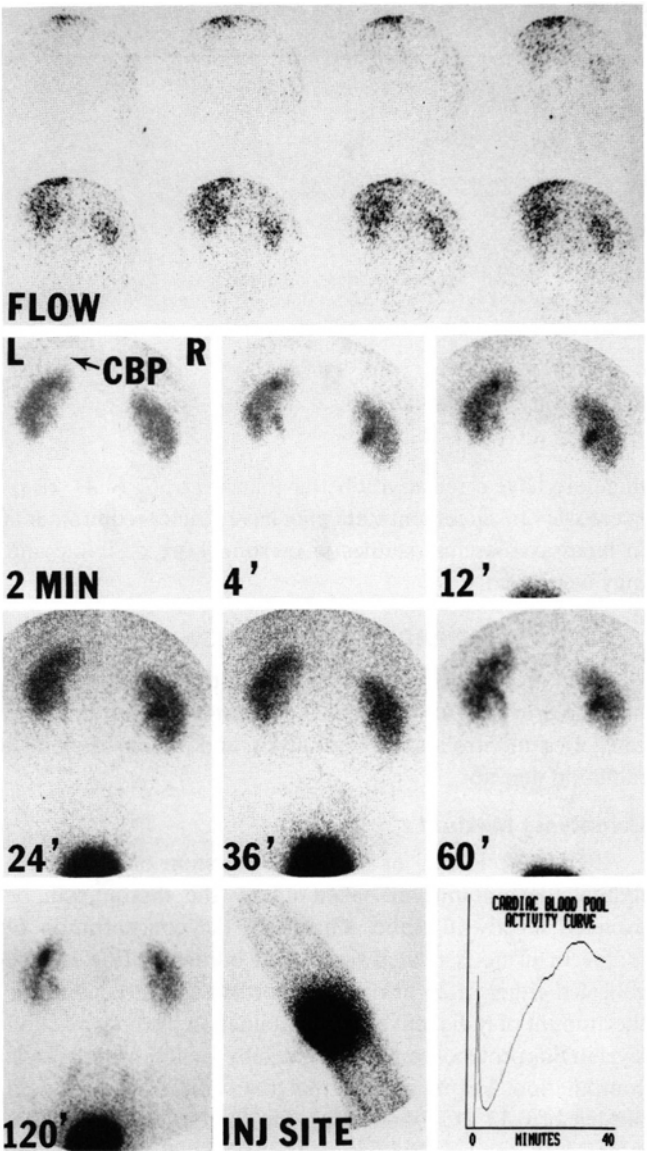


**FIG. 2.** DTPA renal scintigraphy. Infiltrated tracer injection. Images are posterior. Simulation of prolonged cortical retention of tracer is apparent in this normal study. As in Figure 1, renal cortical activity parallels CBP activity. (Reproduced with permission of the authors (*1*)).

pretation of hepatocellular dysfunction in the hepatobiliary study shown in Figure 1, the normal leading edge transit (time to first hepatobiliary tree visualization = 5 min), the rapid and abundant appearance of gallbladder and gastrointestinal activity, the late appearance of CBP activity, and inspection of the injection site image (INJ SITE) all direct one to the correct conclusion—normal study. Because a subcutaneous injection occurs so frequently, the injection site must be imaged in all studies as shown in the renal scan images in Figure 2. Additionally, inspection of the CBP disappearance curve may be helpful (*1*). In this instance, persistence of CBP activity beyond 5 min and rising parenchymal activity even after excretion begins is not a sign of abnormal hepatic clearance (*2,3*).

In the event of a subcutaneous (infiltrated) dose, parenchymal activity will gradually rise as the dose is slowly absorbed Appearance of tracer activity in the biliary tree [Fig 1., technetium-99m-DISIDA, 185 MBq (5 mCi)] or similarly in the renal collecting system [(Fig 2., technetium-99m-DTPA, 740 MBq (20 mCi)] within the usual time frame suggests that the studies are normal. Potential misinterpretation can be avoided if the injection site is routinely imaged for all studies in which "clearance" is assessed.

## REFERENCES

*1.* Blue PW, Manier SM, Chantelois AE, et al. Differential diagnosis of prolonged cortical retention of radiotracer in technetium-99m DTPA renal scintigraphy. *Clin Nucl Med* 1987;12:77–83.

*2.* Kuni CC, Klingensmith WC. Performance of the radionuclide hepatobiliary study, and principles of interpretation and normal appearance. In: *Atlas of radionuclide hepatobiliary imaging.* Boston: G.K. Hall Medical Publishers; 1983:17–30.

*3.* Blue PW. Biliary scanning interpretations using Technetium-99m DISIDA. *Clin Nucl Med* 1985;10:742–751.