## Experience with the Use of A PHO/CON Tomographic Scintillation Camera in Bone Scanning

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Bone scintigrams of various bone diseases were made with a Pho/con tomographic scintillation camera developed by Searle Radiographic Inc. This paper presents the cases and also demonstrates the salient usefulness of this particular radiodiagnostic procedure in the diagnosis of bone disease.

The Pho/con tomographic scintillation camera in our possession is the only one currently available in this country and has been in use at our university since May of this year.

Results

Scintigrams made with the heretofore used scintiscanners or scinticameras represent images of RI distribution projected to a given plane and do not provide any information at all concerning depth. They therefore have the disadvantage of failing to detect deep-situated lesions in organs which are large and boluminous or which are overlapped by other organs. With this Pho/con tomographic scintillation camera, one can easily obtain tomograms at 12 desired depths along the body axis and hence wtihout much interference by adjacent organs. It permits visualization of deep-seated lesions with far greater clarity and distinctness than with the conventionally used devices so far and threby helps enhance diagnostic accuracy.

## The Absorption of $^{99m}$Tc $\gamma$-Ray by Bone and Soft Tissue

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Recently, the scintigram with $^{99m}$Tc-labeled compunds has been routine procedure, because of it's ideal physical characteristics. The short physical half life of six hours, the absence of beta emission, and the gamma ray of 140 keV permit the administration of large amount of radioactivity.

For scintigram of deep or large organ, the absorption of $^{99m}$Tc $\gamma$-ray by bone and soft tissue should not be negligible. For example, bone scintigram with $^{99m}$Tc-phosphorous compounds shows different pictures depending upon the anterior and the posterior views, because of it's rather lower energy.

Therefor, the linear attenuation coefficient and the half value layer of bone and soft tissue were measured with $^{99m}$Tc $\gamma$-ray and others ($^{197}$Hg, $^{203}$Hg, $^{131}$I, $^{198}$Au, $^{85}$Sr).

Results

1) The linear attenuation coefficient of $^{99m}$Tc $\gamma$-ray was: bone $-0.240\ cm^{-1}$, acrylite $-0.173\ cm^{-1}$, Mix D $-0.155\ cm^{-1}$.

2) The half value layer of $^{99m}$Tc $\gamma$-ray was: bone $-2.89$ cm, acrylite $-3.98$ cm, Mix D $-4.47$ cm.

It was concluded that the lower photon energy of $^{99m}$Tc was influenced by bone and soft tissue, but it appeared to be most suitable for the present imaging devices. Therefore pictures of multiple views are necessary in case of the scintigram with $^{99m}$Tc-labeled compounds.