《招待講演 (4)》

Ace of Hearts

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In the last 2 decades radionuclide studies of the heart have found wide application to detect coronary artery disease, characterize jeopardized myocardium, identify the site and extent of acute necrosis, and determine the functional impact of these processes. The technology has advanced, through development of new radiopharmaceuticals and instrumentation. Specific measurements of perfusion, chamber volume, global and regional function and metabolism can be readily made. These techniques will continue to find widespread application, since the physiological data from radionuclide imaging adds significant insight about the status of the myocardium when added to anatomic techniques, such as ultrasound, angiography, MRI and fast CT.

We can expect significant advances in our understanding of cardiovascular disease as small light weight instrumentation allows continuous monitoring of function during activities of daily living and as new radiopharmaceuticals are developed for measuring receptor occupancy and the rate of progression of atheromatous disease. These advances in imaging, coupled with new therapeutic agents for heart failure and cholesterol lowering drugs, will allow better risk stratification and more precise use of medication. These considerations suggest that of all the imaging procedures available for evaluation of the cardiovascular system, radionuclide techniques are the "Ace of Hearts".

《招待講演 (5)》

Quantitative Bone Mineral Assessment in Osteoporosis

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Considerable effort has been expended in the development of methods for quantitatively assessing the skeleton so that osteoporosis can be detected early, its progression and response to therapy carefully monitored, and its risk effectively ascertained. Numerous quantitative methods have been used with variable precision, accuracy and sensitivity. Precision here meaning longitudinal reproducibility in serial studies, accuracy meaning reliability that the measured value reflects true mineral content, and sensitivity meaning capacity to readily separate an abnormal from a normal population or to readily detect changes with time in a patient or in a population.

One of the earliest methods developed, single photon absorptiometry (SPA), measures principally cortical bone of the radial diaphysis while the introduction of rectilinear scanning provides improved precision for area measurement of the radial metaphysis and calcaneous, sites of proportionally greater trabecular bone. In the last 10 years, techniques have become available that

	SPA	QCT	QCT-A	DPA	DPA-X
Site	Radius, heel	Spine	Spine, hip	Spine, hip, TB	Spine, hip, TB
Sensitivity	.5–1X	2–3X	2–3X	1X	1X
Precision	1–2%	2–5X	1–2%	2–4%	1%
Accuracy	5%	5–15%	5–10%	4–10%	3–6%
Time	15 min	15 min	10 min	40 min	5 min
Radiation	10 mrem	100–500 mrem	100–200 mrem	5 mrem	5 mrem
Cost	$50–75	$100–200	$100	$100–150	$75

can measure sites in the central skeleton. Quantitative computed tomography (QCT) provides a measure of purely trabecular bone of the vertebral spongiosum or other sites, while dual photon absorptiometry (DPA) measures an integral of compact and cancellous bone of the spine, hip or total body (TB). Recent software and hardware advances in QCT have substantially improved performance characteristics by controlling technical parameters and automating the procedure (QCT-A). Recent developments in DPA with the use of a dual-energy X-ray source in place of an isotope and improvements in detector configuration have greatly enhanced the speed and precision of this X-ray-based technique (DPA-X). The performance characteristics of these techniques are presented below.

A consensus has not yet been developed on which method or methods are most efficacious for diagnosing and monitoring of the individual patient or for extensive screening of large populations. In this review the relative merits of each technique will be discussed from the technical and clinical perspectives, and the indications for their use will be presented.

《招待講演 (6)》

Radiolabeled Antimyosin Antibody as a Tool for Evaluation of Myocardial Damage

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The usefulness of radiolabeled anticardiac myosin antibodies has been demonstrated in the detection of myocardial necrosis. It is reasoned that cell membrane integrity is disrupted after myocardial injury and this permits the entry of the antibodies that then bind cardiac myosin, the most abundant and highly insoluble myocardial protein in myocardial cells.

Initially it was developed as a method for identifying irreversibly necrotic myocardium in myocardial infarction. Experimental studies demonstrated an inverse relationship between regional myocardial blood flow and the uptake of the tracer even in areas of low blood flow. Antimyosin was labeled with either Tc-99m or In-111 for scintigraphic agents. When the Fab fragments of antibodies are used, immunogenecity can be reduced and blood clearance is shortened. Clinical studies have shown that the preparation is well tolerated with acceptable radiation dose for scintigraphy. Recently it's efficacy in the diagnosis of myocarditis and human cardiac transplant rejection has been advocated.

We have recently reported the usefulness of monoclonal antimyosin antibodies in the quantitative assessment of myocardial necrosis. In our experimental canine model, we compared the myocardial uptake of In-111 antimyosin antibody in