

NMR imaging offers new view of pelvis

High-powered magnets are carving a secure niche as medical tools to help physicians peer beneath a patient's skin and bones and construct detailed images of the brain, spinal cord and cardiovascular system. Images of soft tissues and organs, invisible to conventional and computerized X-rays and fuzzy in ultrasound scans, are becoming clearer and clearer as researchers of the several-year-old experimental science of creating images with nuclear magnetic resonance (NMR) fine tune their craft and explore its limits (SN: 10/15/83, p. 250; 5/28/83, p. 343). The niche has grown even larger in recent months as several NMR teams report preliminary success in a new area—painting pictures of the human pelvis in ways that may improve diagnosis of prostate and bladder cancer and provide detailed information about cyclic changes in the female reproductive tract.

"The pelvis is particularly well suited to NMR scanning because of the abundant natural contrast provided by pelvic fat and by urine in the bladder and gas in the bowel," reports Patrick J. Bryan, a radiologist at Case Western Reserve University in Cleveland.

While he cautions that the relatively expensive NMR images will probably not replace cheaper ultrasound in diagnosing most benign pelvic disease, Bryan says that NMR's role in determining the extent of cancer in a diseased organ could be important. "I think it will be at least as good if not better than the computerized tomography [the compilation of X-rays most often used to diagnose cancers in the pelvic region]," he told SCIENCE NEWS.

The power of NMR in visualizing soft organs arises from the differing water—and hence hydrogen—content in each type of tissue. A patient to be scanned is placed within a cylindrical high-powered magnet. All the naturally occurring hydrogen nuclei (or protons) within the portion of the body to be scanned align themselves with the powerful magnetic field. Low-energy radio waves that are absorbed by the protons and knock them out of alignment are then applied. Once the radio signal is turned off, the protons release tiny amounts of energy that can be compiled and used by a computer to construct an image, based on the intensity of the signal produced by each type of tissue. For example, fat emits a stronger signal and appears somewhat brighter than muscle and much brighter than bone in an NMR image. The time used by each proton to "realign" also shapes the signal.

Hedvig Hricak and colleagues at the University of California at San Francisco used an NMR scanner to check the pelvic cavities of five healthy volunteers and twenty men with varying stages and forms of pelvic disease—most with cancers of the prostate or bladder. The preliminary

results, reported in the December AMERICAN JOURNAL OF ROENTGENOLOGY indicate that the NMR images were more sensitive than CT scans in detecting the earliest stages of prostatic cancer and more accurately diagnosed disease that had spread beyond the primary organ.

If substantiated in further study, Hricak's preliminary findings could be especially important to the roughly 76,000 U.S. men who contract cancer of the prostate each year, says Melvin M. Figley, a radiologist at the University of Washington in Seattle. "It implies that it may be possible to recognize carcinoma of the prostate as separate from benign hypertrophy of the prostate [which triggers similar clinical symptoms]," he told SCIENCE NEWS. Such cancer can be accurately detected by clinical exam, biopsy or tests of body fluids, Figley says, but by then the cancer has usually grown beyond the gland and infiltrated the pelvis. "This suggests that it may be

possible to detect carcinoma before it has escaped the confines of the capsule, and to distinguish it from much more common hypertrophy. Both [prostate cancer and hypertrophy] are very very common in older men. This could aid in early diagnosis in a non-invasive way," he says.

In addition to clearly differentiating between cancerous and healthy tissue in the organs closely packed within the pelvic cavity, the NMR images described by Hricak, Bryan and others permit physicians to noninvasively map cyclic changes in female reproductive tissue such as the endometrium, the blood-rich lining of the uterus.

"The ability to show dynamic changes of the endometrium in the various phases of the menstrual cycle and pregnancy may have value in the study of female infertility, primary and secondary amenorrheas, and other problems of female reproductive endocrinology," says Hricak, "as well as the recognition and management of pathologic conditions associated with pregnancy." —D. Franklin

Gambling with depression: Tonic action?

Pathological gamblers never take the money and run, and it is this that sets them apart from social bettors. Winnings are nothing; the thrill of "the action," as they call it, is everything. Researchers studying such compulsive wagering now suggest that this behavior—much like other addictive behaviors—may point to a serious underlying mood disorder, which if untreated could lead to other addictions and perhaps ultimately to suicide. Others disagree, however, and argue that gamblers are pathological liars who fabricate evidence of depression and desperation to excuse their inevitable run-ins with the law.

Psychologist Richard A. McCormick and his co-workers at the Cleveland Veterans Administration Medical Center in Brecksville, Ohio, performed psychological examinations on 50 compulsive gamblers who, after repeated failures to abstain, were finally hospitalized for treatment. As they report in the February AMERICAN JOURNAL OF PSYCHIATRY, three out of every four subjects were found to suffer from serious depression; four of five had had at least occasional thoughts of suicide during the previous year, and six patients had actually made a "potentially lethal" attempt at suicide.

In addition, the researchers report, 46 percent of the patients were suffering from some form of mania—characterized by abnormally elevated mood, restlessness and racing thoughts; nearly one-third showed symptoms of both depression and mania, lending support, the researchers say, to the widespread clinical impression that gamblers are emotionally unstable. Whether the mood disturbances precede the gambling is not entirely clear, McCor-

mick concedes; for seven subjects, the onset of depression clearly preceded the pathological stage of gambling, but for most the memories of depression and gambling are so intertwined that they cannot be sorted out. What is clear, the researchers say, is that the depression is not merely a temporary reaction to a difficult life situation; it is an enduring mental disorder, for which the act of gambling seems to be the only effective antidepressant. In this sense, McCormick says, the "action" of gambling might be viewed as an addictive energizer with effects much like alcohol, drugs or physical exercise; more than a third of the subjects also had a history of alcohol or drug abuse.

Reaction to these findings has been mixed. Robert Politzer, a therapist with the Washington Center for Pathological Gambling in College Park, Md., says that his own clinical experience corroborates the report. Suicidal ideas and attempts among gamblers are "definitely excessive," he says. But psychologist Abe S. Kramer of the Brooklyn Veterans Administration Hospital disputes McCormick's findings. "Gamblers lie," Kramer explains. "When they get into trouble, as they always do, they make up what are often very plausible stories about having been depressed, upset or suicidal." Based on extensive psychological testing of compulsive gamblers, Kramer says that he has found only one trait that gamblers consistently share: deception. Therapy directed at an underlying disorder would be misdirected, Kramer adds: Gamblers are addicted, like alcoholics, to "a selfish and greedy urge," and they require a "hard-nosed, realistic" treatment of addiction.

—W. Herbert