# Medical Aspects of Nuclear Radiation Emergencies

By Clarence C. Lushbaugh, BS, PhD, MD, Karl F. Hübner, MD, Robert C. Ricks, PhD

THE GREATEST PROBLEM in developing nationwide emergency preparedness for radiation accidents is caused by their infrequent occurrence. The probability that any particular EMT team will ever be involved in a serious radiation accident is so low that any need for preparation and training for this rare event seems exaggerated. Only a few medical centers (possibly four) in this country have ever faced the problem of caring for radiation-accident cases more than once. Once a hospital or ambulance emergency team has taken care of a radiation-accident case, that team can be considered as trained, particularly if they learn what mistakes they made and correct them. Yet they may not have another chance in their lifetime to care for another radiation-accident case unless our experience of the last 30 years is wrong and radiation accidents become more commonplace. Since, however, radiation accidents, like lightning, do occur even though they do not happen often nor in the same place, preparedness is essential — but largely to allay the common fear of radiation and the unknown mysteries that surround it.

Most people do not believe how rarely the radioactive aspects of a radiation accident require immediate emergency action. However, the important rule is that even the heavily irradiated or contaminated patient must have first aid to ensure his breathing and blood pressure. Flail chests, fractures, hemorrhaging arteries, shock and the like have first priority. No one gets any points at all for a well-decontaminated radiation victim who died from shock during the cleanup. The second most important historically accurate fact is that no radiation accident case has ever been so contaminated that he was a threat to his rescuers.

Generally speaking, when called to the scene of a radiation emergency EMS personnel may assume that police or plant security has arrived and initiated crowd control as well as area isolation. This is particularly true when radiation accidents occur within the confines of nuclear power generating stations or other industrial sites which routinely handle radionuclides. Such is not the case when accidents involving the transport of radioactive materials occur. Thus, EMS personnel should primarily be involved only with the initiation of first aid and rescue techniques. When, however, EMS personnel are called upon to play a role in crowd control as well as administration of first aid or rescue techniques, a few basic principles for personnel protection should be followed. These basic rules serve to protect the accident victims, emergency response personnel, and bystanders as well. Remember that fear, or avoidance of radiation hazards, should never interfere with the administration or extemporization of first aid or rescue techniques.

Upon arriving at the accident scene, visually survey the surrounding area. If possible, park the ambulance upwind of the accident scene avoiding any areas of liquid spills or leaks from transport vehicles or containers that may have been broken in the accident. Look for key elements identifying a potential radiation accident. Such elements include radioactive transport tags attached to vehicles, radioactive shipping labels attached to containers, or information which may be elicited from the victim or victims themselves. Be particularly aware of fire or fire hazards at the scene of a radiation accident and make all attempts to stay upwind of them. Have someone responsible search for a transport manifest which will identify the isotope or isotopes being transported. This manifest should be located in the cab of the transport vehicle. If possible radioactive contamination prevents this search (do not unnecessarily contaminate personnel), it is possible for police personnel to contact the shipping dispatcher directly.

Remember that three basic principles will allow you to limit the radiation exposure to attending personnel and the victim as well. These principles are time, distance and shielding. Well-planned and practiced rescue techniques will limit the time spent in removing a victim from an area of potential radiation exposure. The distance from a source of radiation is important since exposure is determined by the inverse square relationship. Doubling the distance away from a source of radiation reduces the exposure by a factor of four, etc. Conversely, as one halves the distance to a source, the radiation exposure increases by a factor of four.