since the development of some of these symptoms requires the passage of time, this mechanism (i.e., noting the development of a patient's symptoms) may not be usable in making decisions about immediate treatment. If greater credence can be placed on dosimeter readings (perhaps once a dosimeter is provided to each individual), then schemes devised to use ionizing radiation doses assigned to individuals could assist in conducting second-stage triage (first-stage triage being based on conventional injuries alone). A scheme that has been reviewed and adopted for use by the NATO signatorees appears in Table 19-1.

V. ADVICE TO THE TACTICAL COMMANDER

The tactical commander will be looking to his medical staff officers for advice on a particularly critical issue: the capability of his force to fight. The radiation exposure status (RES) category system (see Table 19-2) is a mechanism for helping the tactical commander maintain the fighting capability of his force despite the exposure of his troops to ionizing radiation.

If a commander's force has accumulated sufficient ionizing radiation exposure to place the personnel in a particular RES category, then the commander must restrict his troops to involvements in which additional radiation exposure is not expected, unless he is willing to accept the next higher risk to his command. With the understanding that biological recovery does take place, the question asked of the command physician is, When can a combat unit's RES category be downgraded? That is, when has the ionizing radiation injury been repaired to the extent that the commander can reasonably risk the presence of his troops in an area in which they might receive additional radiation exposure? This is not a trivial question. If the command physician underestimates the unit's recovery, he places an unnecessary constraint on the tactical unit commander in that he may not employ his unit in an operation in which it may accumulate any additional

TABLE 19-2

RADIATION EXPOSURE STATUS (RES) CATEGORY SYSTEM

RES	Dose (cGy)	Casualties (percentage)	Nuisance symptoms (percentage)	Risk
0	0	0	0	None
1	0–70	1	2.5	Negligible
2	70–150	2.5	5	Moderate
3	150–	5	Undesignated	Severe

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) CATEGORY SYSTEM

Nuisance *symptoms* (percentage)	Risk
0	None
2.5	Negligible
5	Moderate
Undesignated	Severe

radiation exposure that might exceed the specified acceptable risk. If the command physician overestimates the unit's recovery, the tactical commander might then plan a critical mission into an area affected by fallout, depending on his forces being able to maintain a certain degree of fighting effectiveness even while accumulating some amount of additional radiation exposure. If the biological damage that resulted from the initial exposure had not been repaired to the degree expected by the command physician, the subsequent exposure might result in an amplified, deleterious biological response from the unit. That amplified response could very well result in the fighting effectiveness of the force being degraded to below that required for the successful outcome of the mission. Too little is known about recovery from ionizing radiation injury to permit a straightforward prediction of what an individual's or a combat unit's "effective remaining dose" might be at some time following a particular ionizing radiation exposure. It is expected that the supporting medical unit will test exposed personnel for depressed biological activity, which may indicate a lower magnitude of initial radiation damage. Tables 9-1–9-8 (in Chapter 9) may be of some use when *making this determination.*

Also, a rule of thumb may be applied to those who have received ionizing radiation exposures to determine their residual biological damage. The rule of thumb indicates that 90% of the total biological damage done by the ionizing radiation exposure will be repaired within 30 days after the exposure. This rule is based on the premise that 10% of the *remaining* damage, which resulted from a single exposure, will be repaired per day. For instance, if an individual had received a 100-cGy exposure on day 0, after 1 day had passed (or on day 1), 10% of the biological damage done by the 100-cGy exposure would have been repaired, resulting in a *remaining* effective dose of 90 cGy on day 1. On day 2, 10% of the remaining damage would be repaired (10% of 90 cGy is 9 cGy recovery), resulting in a *remaining* effective dose of 81 cGy (90 cGy − 9 cGy = 81 cGy). This sort of rule results in an exponentially declining function which, if taken through a 30-day period, arrives at a prediction of 90% recovery within that period. Some have criticized this estimation of 10% recovery of the residual damage per day as being optimistic. They maintain that the correct estimation should be closer to 2.5% recovery of the residual damage per day. If 2.5% recovery per day of the residual damage is taken through a 30-day period, the prediction of biological recovery would be closer to 50% recovery from the total biological damage within that period.

A scheme has been proposed by the British for determining a remaining effective dose at some time after an initial exposure or even multiple exposures, although it has not yet been ratified by the United States. In the scheme, the operational exposure dose (OED) is determined by

$$\text{OED} = \text{AAD} - 200 - 15t \text{ (cGy, free in air)}$$