S.1. Signs and Symptoms of Agent Exposure ........................................... xxiii
1.1. Symptom Frequency for 18,495 Gulf War Veterans Evaluated in the Comprehensive Clinical Evaluation Program ........................................... 4
3.1. Lewisite: Attributes and Responses ............................................. 19
3.2. Incapacitating Levels of Lewisite ............................................... 21
3.3. Chemical and Physical Properties of Phosgene Oxime .............. 28
3.4. Chemical and Physical Properties of Sulfur Mustard ............... 33
3.5. Effects of Exposure to Mustards (H or HD) .......................... 41
4.1. Relative Lethalities of Selected Natural and Synthetic Poisons ........................................... 54
4.2. Comparative Lethality of Some Toxins and Chemical Agents in Mice ........................................... 57
4.3. Exposure Effects of Ricin ......................................................... 62
4.4. Effects of Varied Trichothecene (T-2) Exposures ................. 76
5.1. Nerve Agent Chemical Structure ............................................. 108
5.2. Persistence of Nerve Agents .................................................. 111
5.3. Anticholinesterase Potency of Organophosphates .............. 118
5.4. Estimates of Nerve Agent Lethality or Incapacitation to Humans ........................................... 127
5.5. Nerve Agent Exposure Limits Established by the U.S. Army Surgeon General ........................................... 128
5.6. Molar Concentration of Agent Required to Inhibit Half of Enzyme Activity ........................................ 137
5.7. Results of Other Delayed-Neuropathy Studies .................. 138
5.8. Signs and Symptoms Following Short-Term Nerve Agent Exposure ........................................ 141
5.9. Severity Classifications for Organophosphate Pesticide Poisoning ........................................ 142
5.10. Signs and Symptoms in Patients with Moderate to Severe Sarin Exposure .................................. 143
5.11. Incidence of Symptoms in Workers Accidentally Exposed to Tabun and Sarin (mild cases) .............. 144
5.12. Signs and Symptoms of Dermal Exposures to Nerve Agents .................................................. 151
5.13. Summary of Published Work on Chronic Effects of Long-Term Exposure to Small or Subclinical Organophosphate Quantities ........................................ 161
5.14. Summary of Published Work on Delayed Effects of Acute or Symptomatic Organophosphate Intoxications .................................................. 162
5.15. Estimates of Threshold Levels for Eye Effects of Selected Nerve Agents .................................... 183
5.16. Estimates of Incapacitating Levels of Selected Nerve Agents .................................................. 183
B.1. Chemical and Physical Properties of Tabun ....................... 196
B.2. Chemical and Physical Properties of Sarin ......................... 197
B.3. Chemical and Physical Properties of Soman ....................... 198
B.4. Chemical and Physical Properties of Cyclosarin ................... 199
B.5. Chemical and Physical Properties of Thiosarin ....................... 200
B.6. Chemical and Physical Properties of VX .......................... 201
B.7. Dermal Exposures to Nerve Agent Required for Lethality to Humans ........................................ 202
B.8. Dermal Exposures to Nerve Agent: Other Effect Thresholds for Humans ........................................ 202
B.9. Exposures to Nerve Agent Vapor Required for Lethality or Incapacitation of Rhesus Monkeys ............... 203
B.10. Animal Performance Effects of Nerve Agent Exposures .......... 203
B.11. Signs and Symptoms Comparison, Percentage Reduction in
       AChE Activity ....................................................... 204