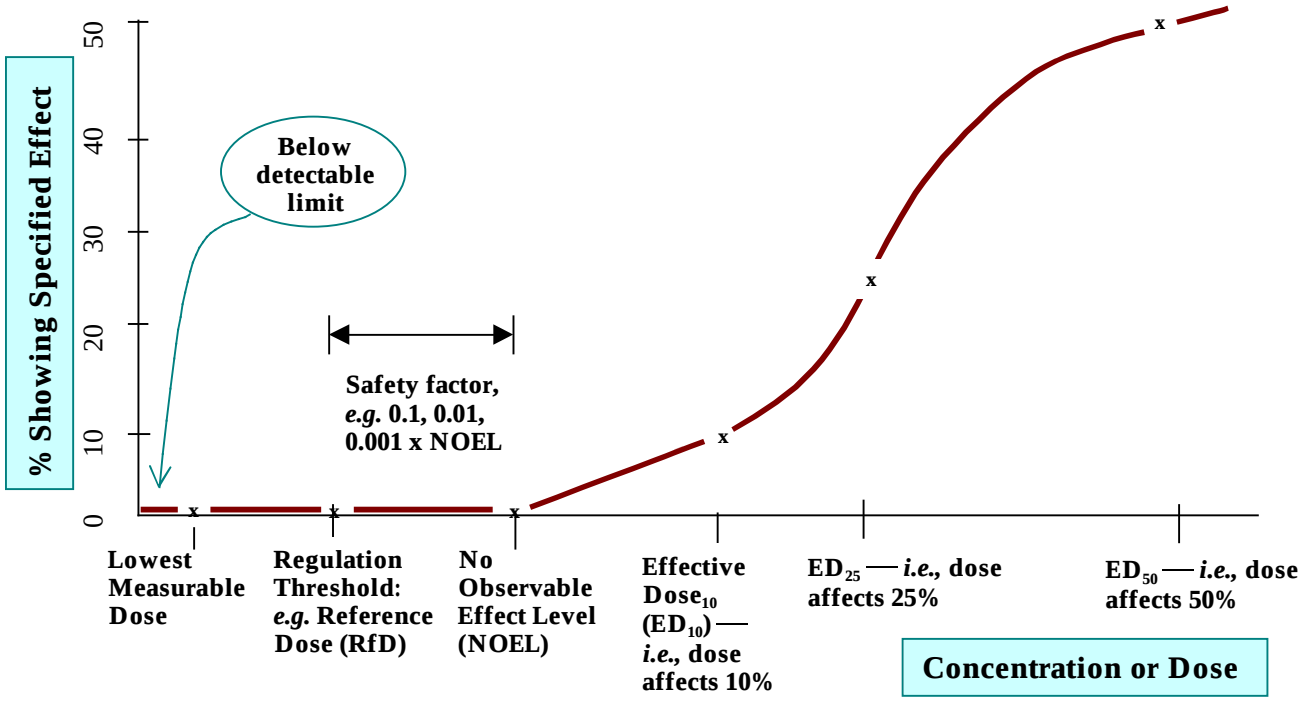
Dose-Effect Relationships

Toxicologists develop "dose-effect relationships" (also called "dose-response relationships") to identify and assess hazards. Data are gathered from toxicity tests in which a group of organisms are exposed to a toxin at a range of doses. Typically, as the dose increases, the toxic effect of concern is produced in a greater percentage of the population. The dose-effect relationship is best conveyed graphically, as illustrated below.

The dosage at which the specified effect is measured is called the **Effective Dose** (ED)[1] and the percent of the population showing the effect is indicated by a subscript. *E.g.*, An ED_{10} means that 10% of the population show the toxic effect; an LD_{50} is the lethal dose at which 50% of the population are killed. Chemicals that are more hazardous affect a greater proportion of the population than do less hazardous chemicals at the same dose. Thus a low hazard chemical will have a higher ED_{50} than a more hazardous chemical.

For dose-effect data to be meaningful, both the "measurement endpoint" (*i.e.*, the specific type of effect) and the population of interest must be defined. For example, the measurement endpoint could be mortality or it could be a sub-lethal effect such as tumor growth, a developmental aberration, or skin irritation. While human beings are the population of ultimate interest in human health studies, rodents are generally used as surrogates for human populations in laboratory studies. Effects on other non-human biota¾ plants and animals¾ are also studied, both for the intrinsic value of those species and also, in some cases, because they are indicators of indirect effects on the human population.

Dose-Effect Relationship



[1] The term Effective Concentration (EC) is used when dosage is measured as a concentration, *e.g.*, in aquatic environments. When mortality is the measured effect, the term Lethal Dose (LD) or Lethal Concentration (LC) is used.