

DOSE RESPONSE CURVE

A dose-response curve is a simple X-Y graph relating the magnitude of a stressor (e.g. concentration of a pollutant, amount of a drug, temperature, intensity of radiation) to the response of the receptor (e.g. organism under study). The response is usually death (mortality), but other effects (or endpoints) can be studied.

The measured dose (usually in milligrams, micrograms, or grams per kilogram of body-weight) is generally plotted on the X axis and the response is plotted on the Y axis. Commonly, it is the logarithm of the dose that is plotted on the X axis, and in such cases the curve is typically sigmoidal, with the steepest portion in the middle.

The first point along the graph where a response above zero is reached is usually referred to as a threshold-dose. For most beneficial or recreational drugs, the desired effects are found at doses slightly greater than the threshold dose. At higher doses still, undesired side effects appear and grow stronger as the dose increases. The stronger a particular substance is, the steeper this curve will be. In quantitative situations, the Y-axis usually is designated by percentages, which refer to the percentage of users registering a standard response (the which is often death, when 50% mark refers to LD50). Such a curve is referred to as a quantal dose response curve, distinguishing it from a graded dose response curve, where response is continuous.

Problems exist regarding non-linear relationships between dose and response, thresholds reached and 'all-or-nothing' responses. These inconsistencies can challenge the validity of judging causality solely by the strength or presence of a dose-response relationship.