Calculating Prevalences and Incidences

1. *Prevalence* = $\dfrac{\text{no. of cases}}{\text{population size}}$
   a. Prevalence can be measured in an closed cohort or in an open population.
   b. Prevalence in cross-sectional.
   c. "Old" cases and "new" cases are counted in the numerator.
   d. Can be measured at a particular point (point prevalence) or over a period (period prevalence). Normally, when we say prevalence we mean "point prevalence."

2. *Incidence proportion* = Cumulative Incidence = Risk = $\dfrac{\text{no. of disease onsets}}{\text{no. initially at risk}}$
   a. Incidence proportion can only be measured in a closed cohort.
   b. Only new onsets are considered.
   c. The time of follow-up must be specified (e.g., 5-year risk of breast cancer vs. lifetime risk of breast cancer).

3. *Incidence rate* = Incidence density = $\dfrac{\text{no. of disease onsets}}{\text{Sum of person-time @ risk}}$
   a. Incidence rates (density) can be measured in a closed cohort or in an open population.
   b. Its numerator is the same as incidence proportion, but its denominator is different.
   c. Methods of calculating the "person-time" denominator.
      i. In a *closed cohort*
         (1) Count person-time for each individual in the cohort and sum (e.g., see text Fig 6.2, p. 100 for an example).
         (2) Break cohort into those who remain healthy (Group 1) and those who develop disease (Group 2). Let Δt period of follow-up.
            (a) Persons who remain healthy, person-time, $T_1 = (N_1)(\Delta t)$.
            (b) Person who develop disease, person-time, $T_2 = (N_2)\times(\frac{1}{2}\Delta t)$.
            (c) Sum of person-time = $T_1 + T_2$
            (d) See Exercise 2 on p. 103 for illustration.
         (3) (Average population size) × (duration of follow-up)
      ii. In an *open population* (e.g., using vital statistics systems): The person-time is approximately equal to $(\overline{N})(\Delta t)$, where $\overline{N}$ is average population size and Δt is the duration of study. For example, a population with an average size of 1000 studied for 1 year accounts for 1000 person-years. In contrast, a population with an average size of 1000 studied for 2 years accounts for (1000)(2) = 2000 person-years.