

## Evidence-based Health Care Special Lecture I: Mini-test (An example of correct answer)

1. Briefly explain the difference among validity, accuracy and precision of the measurements.
  - \* Validity means that the investigator correctly measures what to want to measure. For example, measuring body weight with various clothes without adjustment lacks validity because measured values reflect the weights of clothes. Accuracy means the correctness of scales, where high accuracy corresponds to low bias. Precision means small random error, therefore the measurements with high precision have long effective digits.
2. Explain the difference between prevalence and incidence as the value of disease amount at population level. Note which value can be obtained from cohort study, cross-sectional study, and case-control study, respectively.
  - \* In cross-sectional study, prevalence can be obtained the proportion of disease patients among the population, which means the disease loadings, needed to design how much medical facilities should be provided. Incidence rate can be calculated as the number of patients divided by the person-time observed in cohort study. In case-control study, odds ratios are obtained, which is approximate measure of incidence rate for rare disease, and is expected to be same as incidence rate in the density-dependent case-control study design.
3. In the study including the hypothesis-testing of the null-hypothesis of no difference between two groups, what is the needed information to estimate the required sample size, in addition to the method of the test, significance level of the test, standard deviation of measurement based on previous studies, and the least difference with scientific meaning.
  - \* Statistical power, which is 1 minus beta-error, where the beta-error is the probability to fail to reject wrong null-hypothesis.
4. To examine whether the ability of calculation can be improved by drinking coffee, the results of simple calculation for 10 subjects were compared between before and after coffee drinking. Briefly explain the adequate method of hypothesis testing.
  - \* Comparing pre-test and post-test values for same individuals should be done by paired t-test or Wilcoxon's signed rank test.
5. Briefly explain the research design with the method of hypothesis testing to examine whether the time to relapse can be prolonged by maintenance chemotherapy or not, for the leukemia subjects in remission after the treatment.
  - \* For the patients with informed consent, the investigator randomly assigns 2 groups, either those getting chemotherapy or those taking placebo, and observe the time to relapse. The patients who have not relapsed in the end of study period are treated as censored observations, and conduct log-rank test or generalized Wilcoxon's test to compare the survival curves of the two groups.
6. Briefly explain the method to test whether the effect of antihypertensive drug on the systolic blood pressures (SBP) may change by time or not, for the SBP data of 10 subjects before taking drug, just after it, 30 minutes later, 1 hour, 2 hours, 3hours, 5hours, and 10 hours later.
  - \* Conduct the repeated measures ANOVA, where the variables are SBPs at each time. The null-hypothesis is that SBP values don't change by time.