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PATIENT'S FACT SHEET
Understanding Clinical Studies

The public regularly learns of research studies claiming to show a connection between a drug, object or behavior and a disease. Occasionally studies reach different conclusions, which is confusing not only to the lay public, but often to health care professionals as well. Disagreements among clinical trials can be caused by differences in the design and/or the way the study was carried out. This information sheet briefly outlines examples of the three major types of clinical studies in use, their advantages and their shortcomings.

The retrospective, or case-control study, uses the medical history of people who already suffer from the disease or condition being studied ("cases"). One example might be menopausal women with osteoporosis. Comparing their histories with those of menopausal women without osteoporosis ("controls") can reveal possible factors that protect against osteoporosis, such as the use of estrogen. The advantage of the retrospective study is that large numbers of records can be evaluated in a relatively short period of time, even with relatively rare conditions. However, the value of this type of study is dependent upon the reliability of old records and is affected by possible influence (even subconscious) by the researchers, who know which records are those of cases and which belong to controls (called investigator bias).

A second type of study is the prospective cohort study. In such a study menopausal women without osteoporosis are grouped into those who use estrogen (subjects) and those who do not (controls). These groups (cohorts) are then followed clinically over a period of time to determine if either group develops more cases of osteoporosis. Due to the need for recruitment and clinical monitoring of subjects, a prospective cohort study is more expensive and cumbersome to perform and takes longer to complete than does a retrospective study. When there are a sufficiently large number of subjects and well-matched controls, the findings of a prospective cohort study are generally considered to be more reliable than those of a case-control study. In this type of study, information to be gathered is determined during the study's design phase and the potential for investigator bias, although not eliminated, is less than that of the retrospective study.

Both the cohort and case control studies are observational studies. The "gold standard" of clinical studies however, is the randomized clinical trial (RCT), the third major type of clinical study. Like the cohort study, this is prospective, in that, for example, menopausal women without osteoporosis are studied over time. But instead of selecting cohorts based on whether or not they are taking estrogen, women not taking estrogen are randomly assigned to take pills either containing estrogen (study group) or an identical appearing placebo pill without estrogen (control group). Ideally this is done in a double blind manner, where the pills are identified by code and neither the researchers nor the study participant know to which group each participant is assigned. At the end of the trial, the medication codes are broken, and the number of cases of osteoporosis in each group is determined. This type of clinical trial is more objective than either type of observational study.

In any type of clinical study, the number of individuals included is very important. The less marked the difference is between the study and control groups, the greater is the number of subjects required to show whether any difference is real or just random happenstance. A study evaluating 10 people who smoke may show no greater incidence of lung cancer than that found in a control group of 10 non-smokers. This small group is not sufficient to demonstrate if lung cancer is caused by cigarette smoking. The number of subjects required to demonstrate a significant finding can be calculated in advance of the study by using statistical methods. Frequently, several research centers may combine their resources to assemble a large enough number of study subjects. This multi-institutional approach has the added advantage of multiple investigators, which reduces investigator bias.

Different studies trying to answer the same question often may reach different conclusions. The ultimate answer to a medical question is usually not found in the results of any one study, but rather through the consideration of many studies reflecting consistent findings.

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