COMMUNITY MEDICINE

Notes

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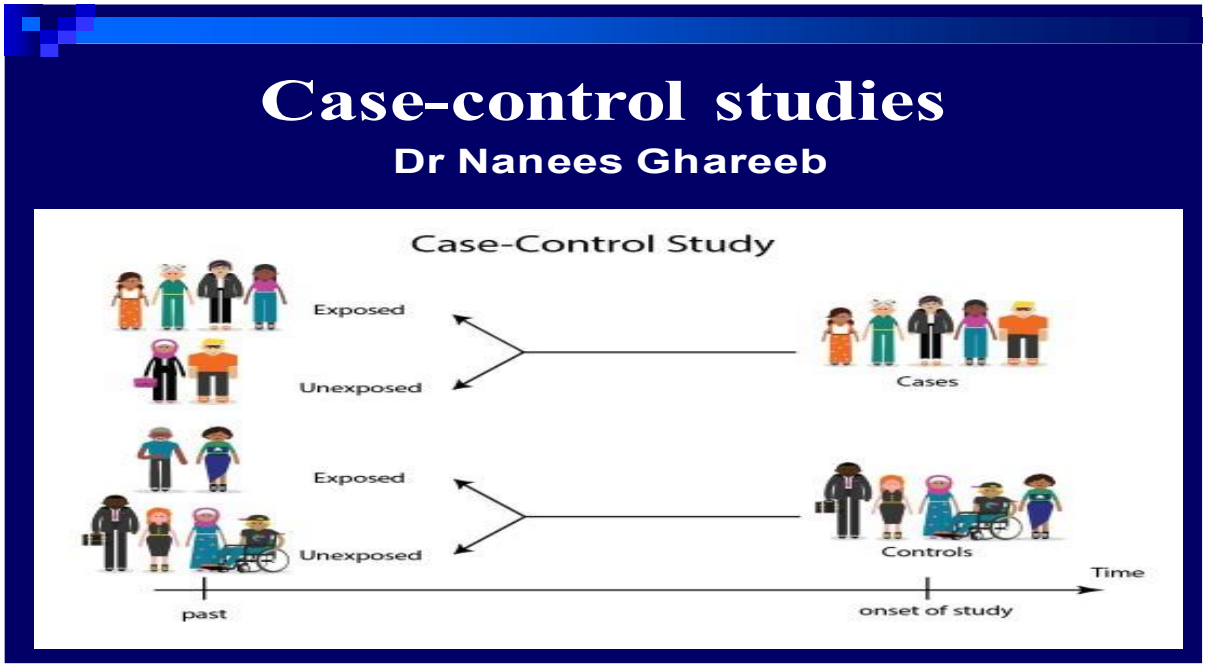
CASE- CONTROL STUDY

- Note from previous lecture:

We have two types of observational studies

1)descriptive 2) <u>analytical (have comparison group)</u>

Today we are talking about case control study which is a type of analytical studies.



*In this type of study, we start from cases then we ask them about previous exposure (past exposure) to the risk factor that we want to study.

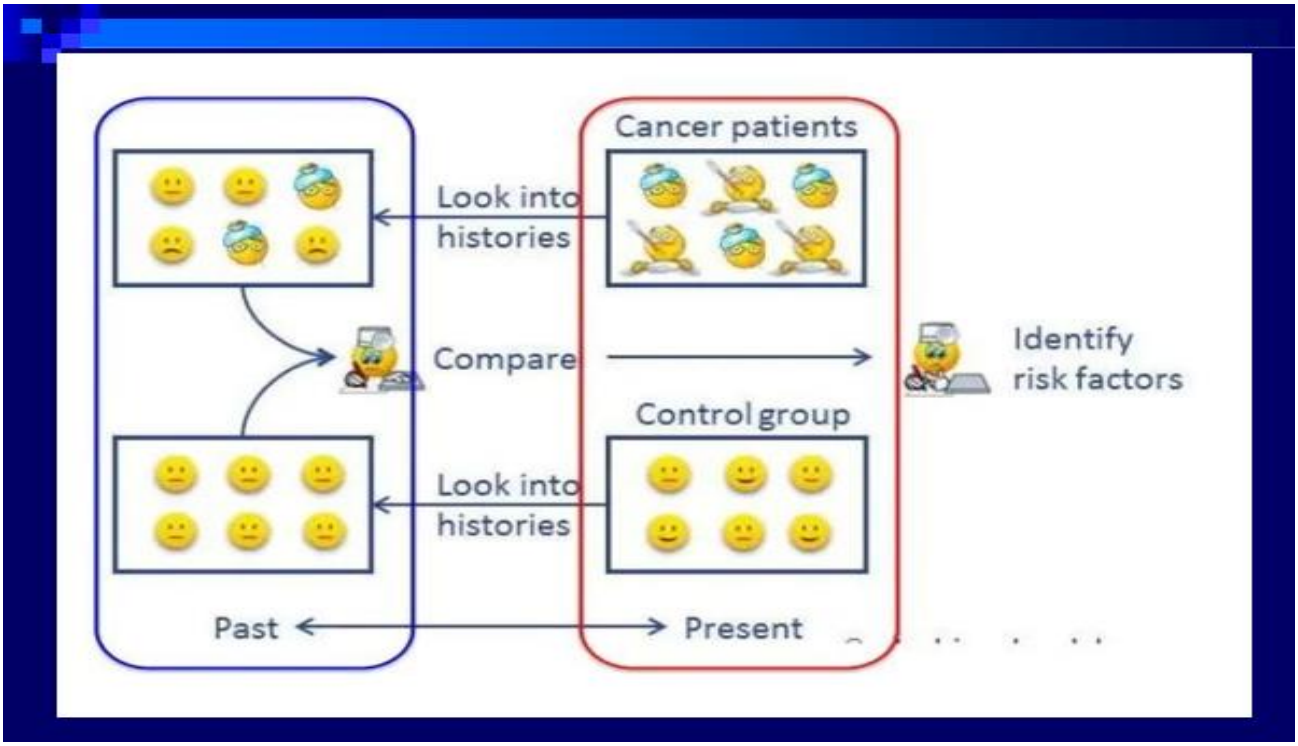
Then take another group from the same population but they don't have the disease (control group) and ask them about previous exposure…

Then we will compare cases to control group.

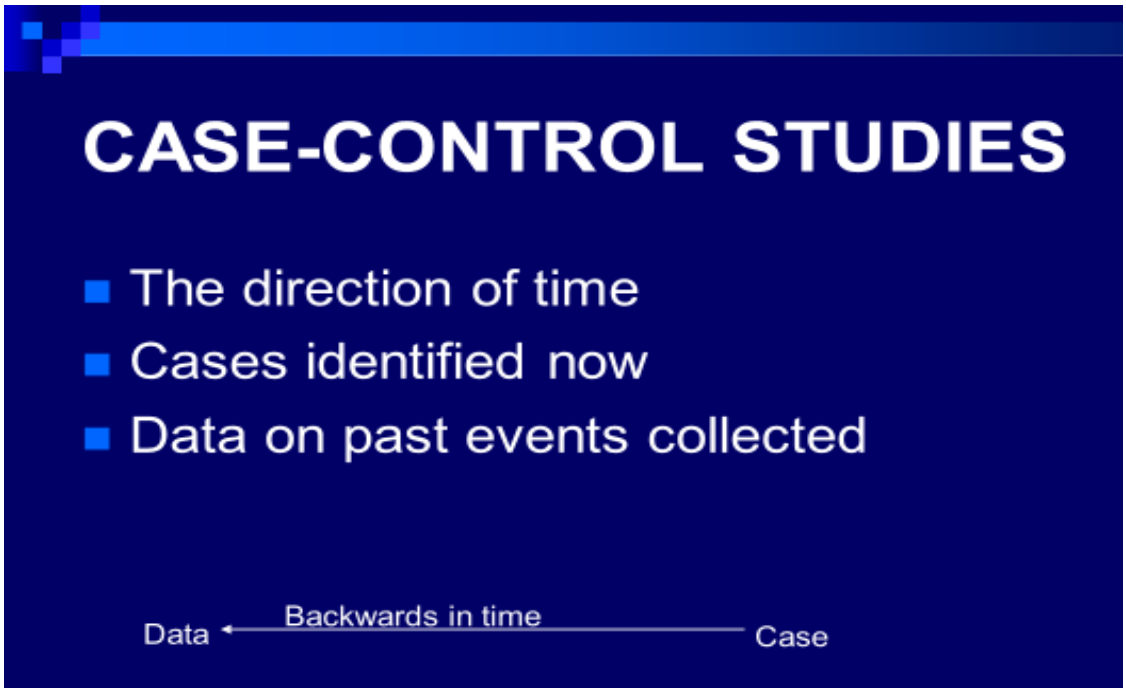
Case-control studies

Are studies in which a group of people with a particular disease (the cases) are compared with a group of people without the disease (the controls). The purpose of the comparison is to determine whether, in the past, the cases have been exposed more (or less) often to a specific factor than the controls

- This type of study is done to identify factors that could be responsible for the development of a disease or drug use problem.

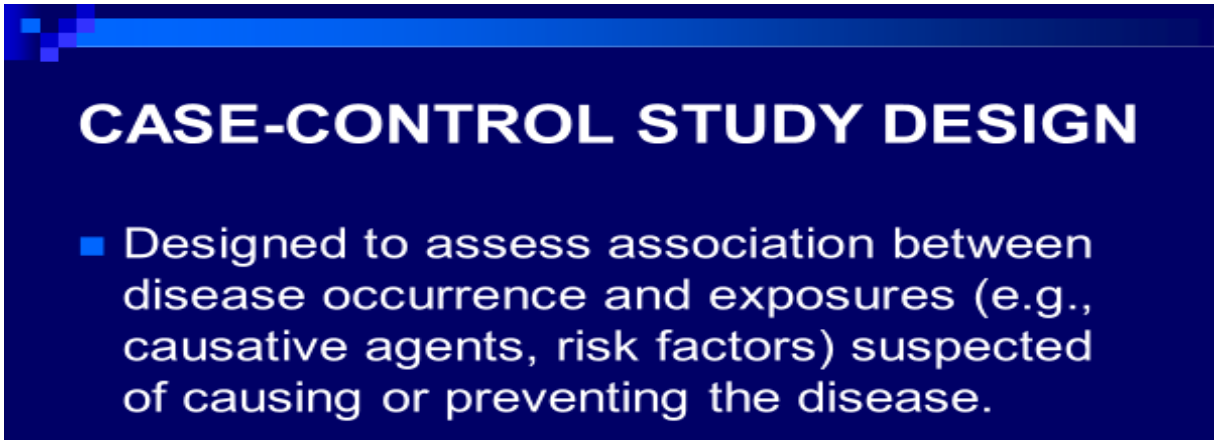


**example: ask cancer pt (cases) about risk factors and ask healthy people(control) about it , then compare the result …



**these 3 points must be done in case control study and here is there explanation:

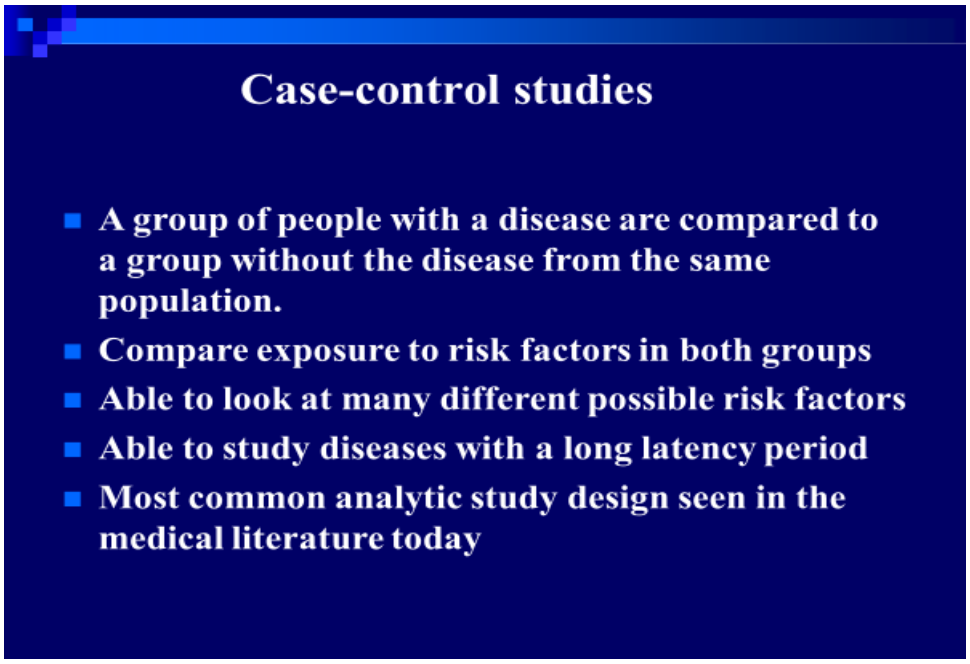
1) We will ask about past “previous exposure” .
2) How will the cases identified (characteristics of them)
3) Collect data from secondary sources like records

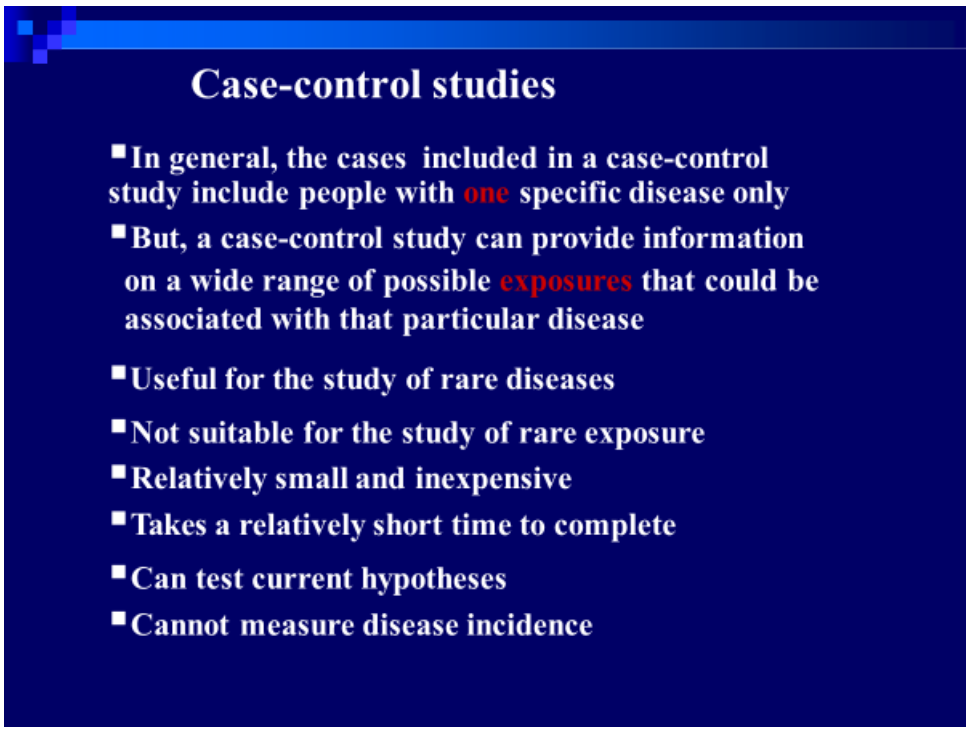


**Is there any risk factor that can prevent a disease??

Yes, but how to know during the study?

By calculating odds ratio if it was less than 1 then the factor is protective, for example, sun exposure decrease vit D deficiency.





**not suitable for rare exposure because the rare exposure means that not much people exposed and as we asking them about past event it will be difficult to find someone recall the exposure event.

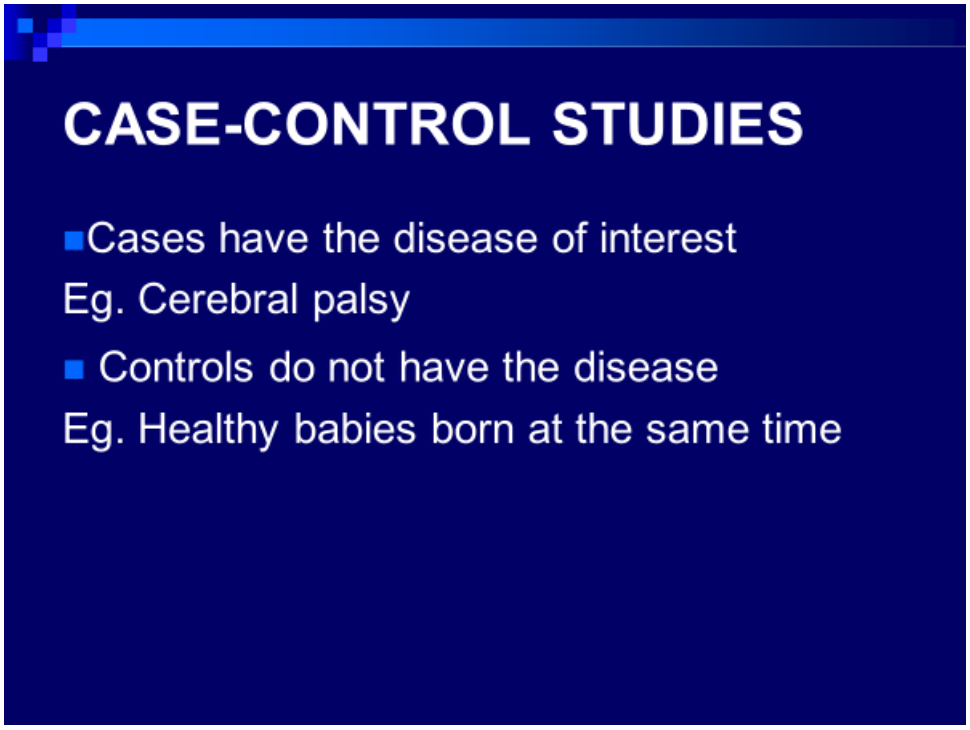
****case control study** can test current hypothesis, and tell about association between factor and disease but doesn't tell that there is obvious cause effect relationship why??

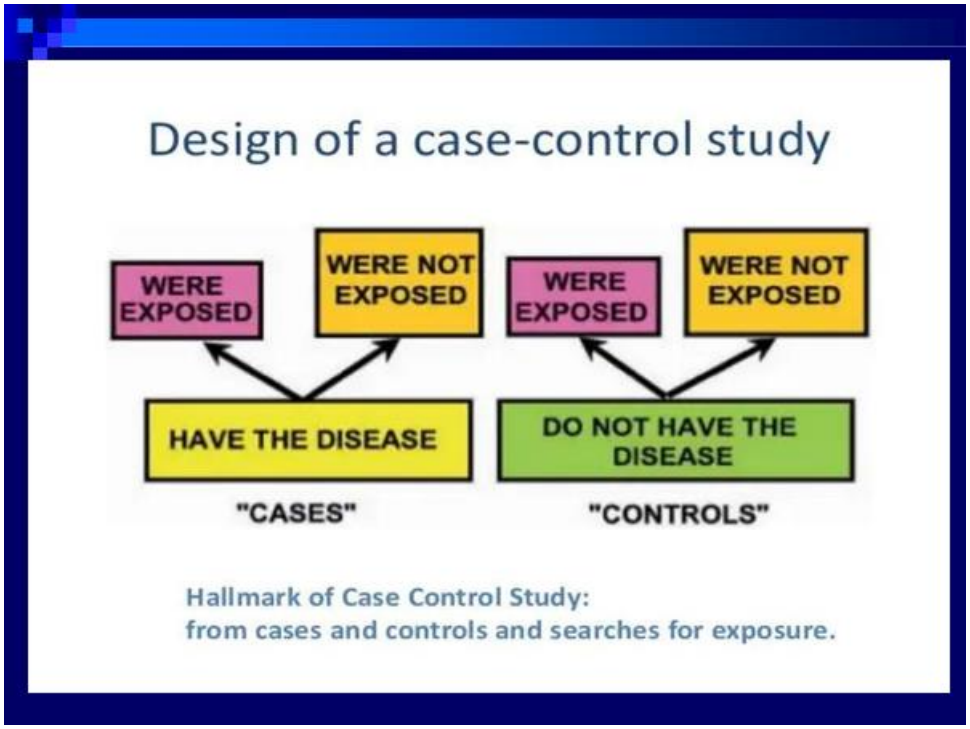
Because we are talking about things happened in the past >>

On the other hand to **cohort study and experimental studies** are reliable in addressing cause effect relation, because we follow up pt for a period of time.

*remember: **cross sectional** study can generate hypothesis.

*case control study **can't** measure incidence and prevalence.





*عند اختيار ال controlيشترط ان تكون المجموعة مشابهة للcases بمعظم الخواص عدا المرض الذي تتم دراسته,بالتالي اختيار ال control يكون بناء على عدم تواجد المرض ويتم سؤالهم عن التعرض لل risk factor لاحقا.

Example

Alcohol Consumption and Risk of Tuberculosis: Seattle/King County, Washington, 1988 through 1990

Alcohol Consumption[a]	Case Patients (n = 151)	Control Patients (n = 545)	Adjusted for Age		Adjusted for Age and Smoking[b]	
			OR	95% CI	OR	95% CI
None	60	263	1.0	Reference	1.0	Reference
Light to moderate	52	214	1.1	0.7, 1.7	0.9	0.6, 1.5
Heavy	39	68	2.8	1.7, 4.8	2.0	1.1, 3.7

Buskin et al (1994). *American Journal of Public Health*,84, No. 1 1

**OR: odds ratio

=1 so, no relation ,<1 the factor is protective , >1 there is association between them بس ما باكدلنا العلاقة

*so, here this means that pt with heavy alcohol consumption have greater risk X2 to develop TB.

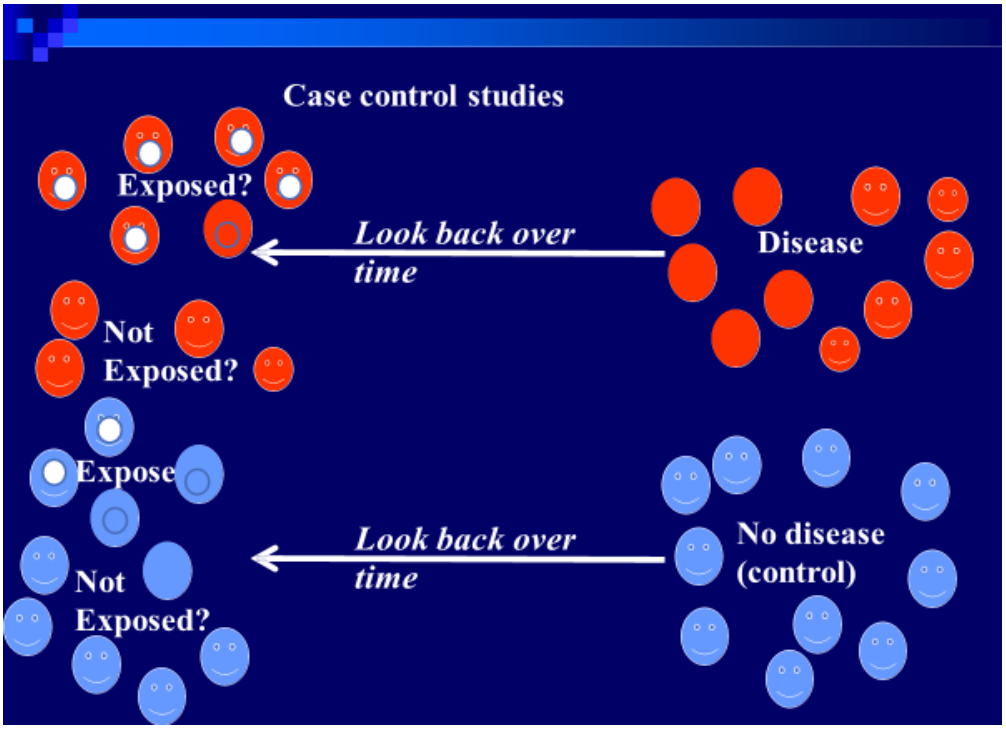
CASE-CONTROL STUDY DESIGN

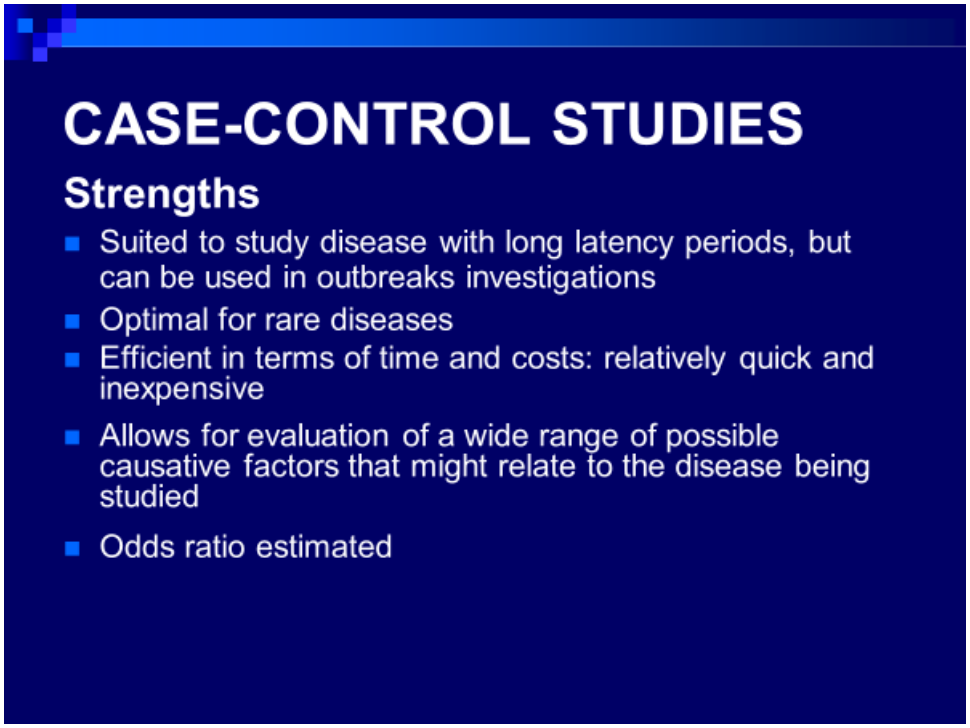
- More efficient than a cohort study because a smaller sample size is required.
- One key feature of a case-control study, which distinguishes it from a cohort study, is the selection of subjects based on disease status.
- Controls are chosen from the same population yielding the cases

**more efficient (less cost) but cohort study is stronger for research purpose.

*controls must be matched with cases from the same population

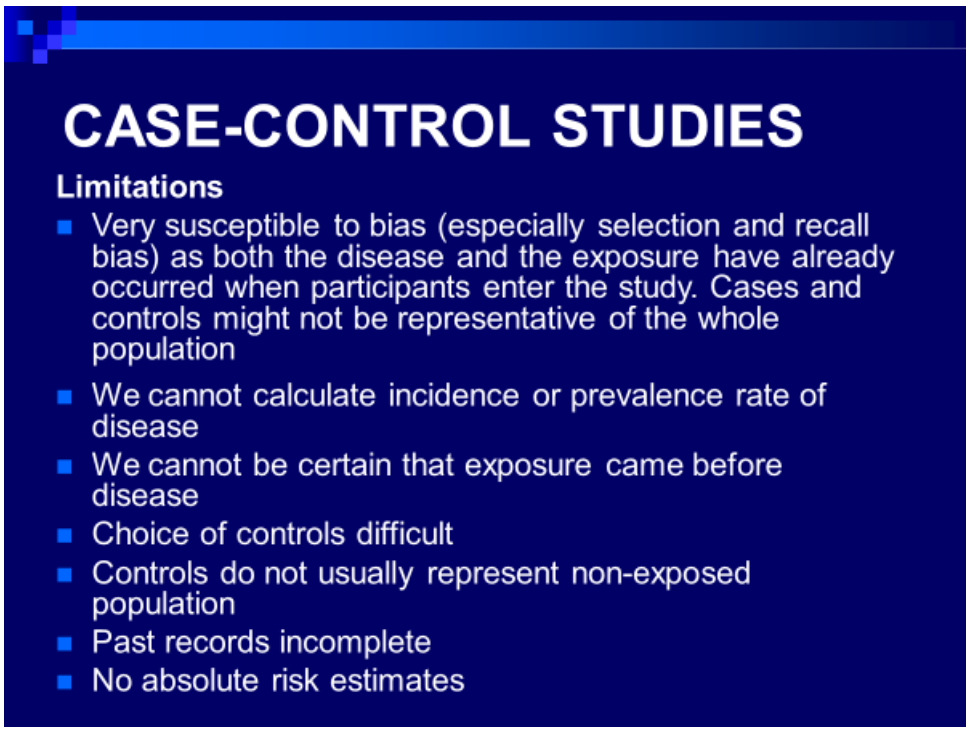
For ex. Cases from hospital A ,controls must be from the same hospital but free from the disease.





**used for disease with long latency period means that it take long time to appear (need follow up), and for outbreak like the cases will have for example food poising symptoms and we will ask them about previous exposure (did they ate meat from that place…)

**most appropriate way to present data of case control study is to calculate odds ratio.

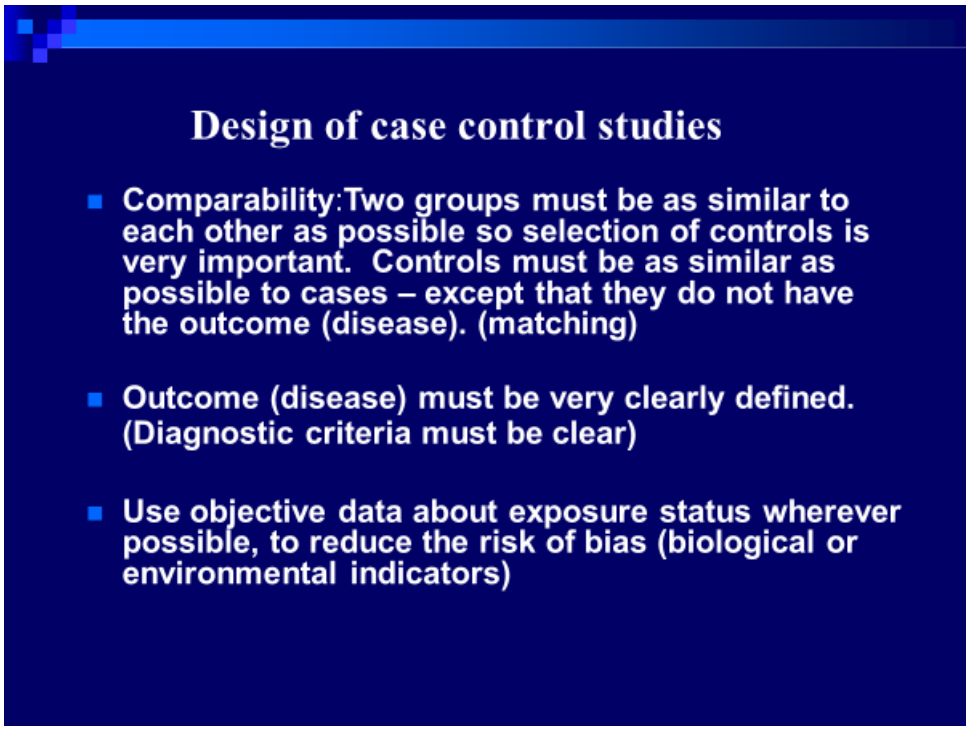


**selection bias in determining the sample and recall bias from pt when they are talking about previous exposure.

*third point: as we said before we cant determine specific cause effect relationship we just know that there is a connection between them.

for example, studying alcohol consumption in relation to lung cancer assume that at end of study odds ratio was >1 so, there is relation but we cant say that alcohol consumption was the cause of lung cancer because maybe patients were smokers and that was the cause of cancer.

*we cant use it to calculate absolute risk because it need follow up and we cant calculate incidence rate.



*subjective data: is the symptoms that pt tell about

Objective data: is sign that seen by doctor or by investigation, and this one is more accurate to us.

How many controls?

- **control-to-case ratio is 1 : 1**
  is the optimal when the number of available cases and controls is large and the cost of obtaining information from both groups is comparable
- **control-to-case ratio is 1 : n**
  When the number of cases is limited or when the cost of obtaining information is greater for cases or controls

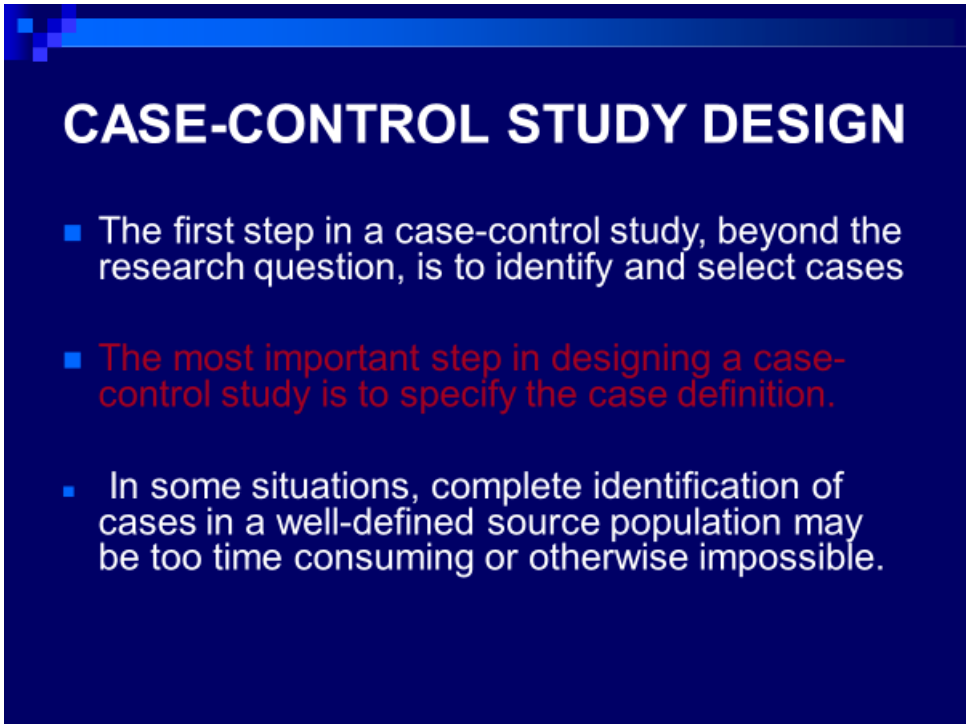
- **As the number of controls per case increases, the power of the study also increase**

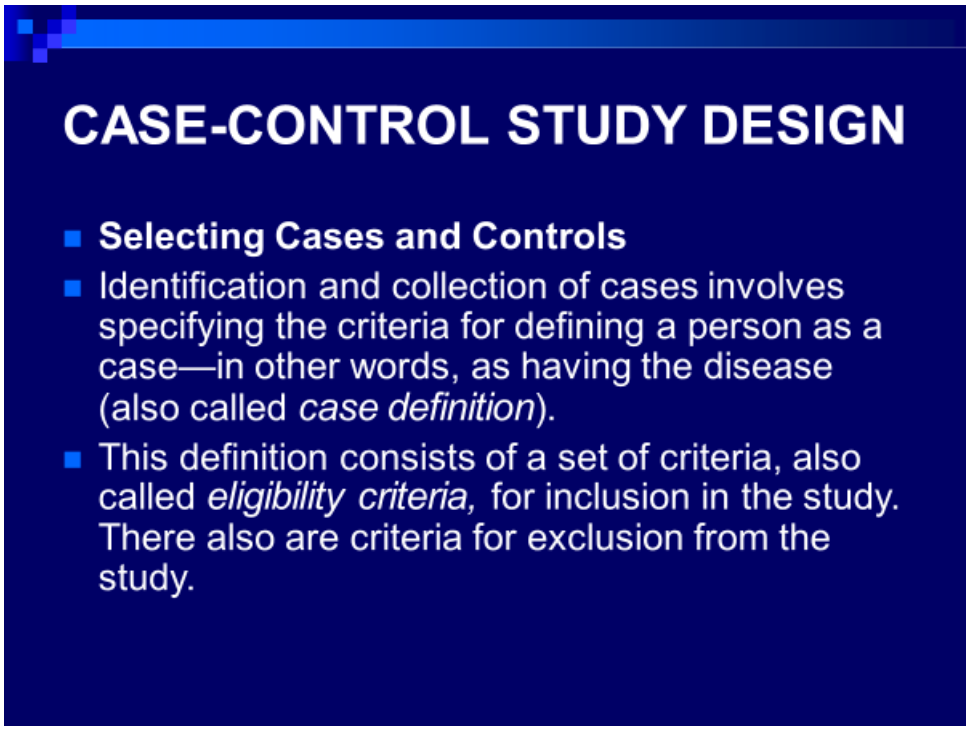
- **It is not recommended that this ratio increase beyond 4 : 1**

**ratio 1:1 is most common used but if we can take more control than cases this will add strength for our study.

Highest ratio we can reach is 4 controls:1cases

*Sometimes if the cases was very rare and its difficult to find cases will be low in comparison to control not 1:1 ratio.

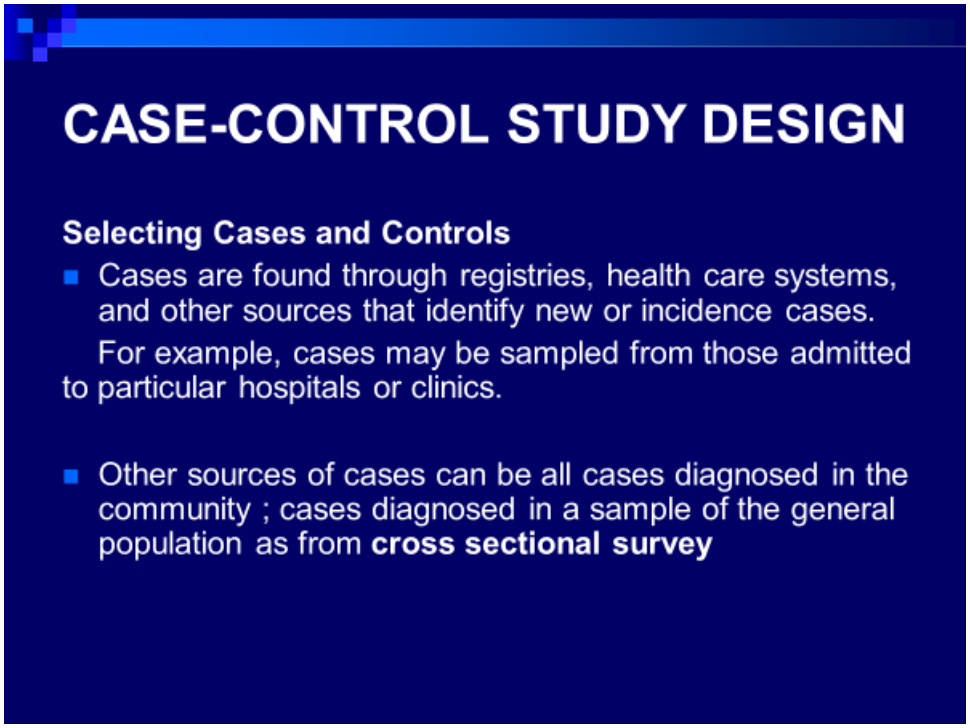




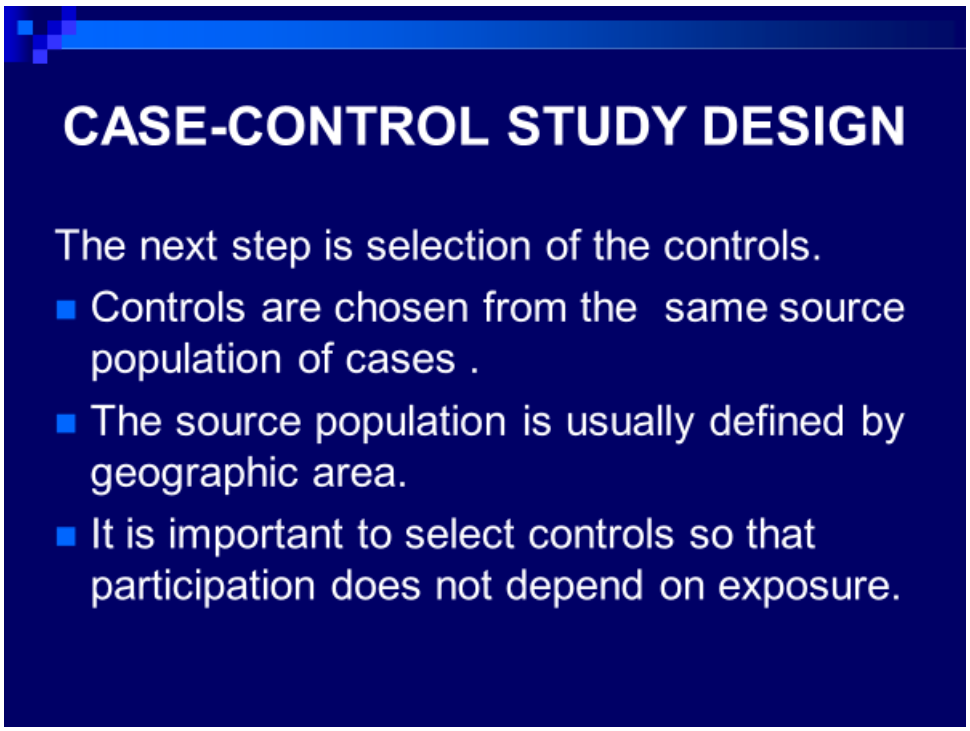
*eligibility criteria:

هي المواصفات التي نضعها لل cases وبناء عليها بنعمل exclusion and inclusion for people in the study

مثلا لو بندرس تاثير تعرض عمال للاشعة في مصنع معين رح نستثني العمال الي تعينو جديد مثلا اخر شهرين ...



**second point: we can take our cases from cross sectional study that done before about the same issue to calculate incidence and prevalence ,so we are going to choose our cases from the same sample of the cross sectional study.



CASE-CONTROL STUDY DESIGN

Source of controls

- The ideal situation is a random sample from the same source population as the cases.
- Investigators may use more than one control group.
- Controls can be selected by sampling from:
  The general population in the same community; the hospital community (patients in the same hospital); individuals who reside in the same block or neighborhood; and spouses, siblings, or associates (schoolmates, co-workers) of the cases.

**we can use multiple control group and study multiple risk factors and that's it the importance of case control study.

Obtaining cases and controls for case control studies

Study	Source of cases	Source of controls
PROM (premature rupture of membrane)	Hospital patients	Hospital patients
Rheumatoid arthritis	Outpatient clinic	Other outpatient clinic
Cervical screening	GP register	GP register

**هذا الجدول موجود في محاضرة ال cohort study الدكتورة حكت نحذفه من هناك لانه تابع للcase control

**the table shows how we choose cases and controls from the same population like in studying PROM we take both of them from hospital…

CASE-CONTROL STUDY DESIGN

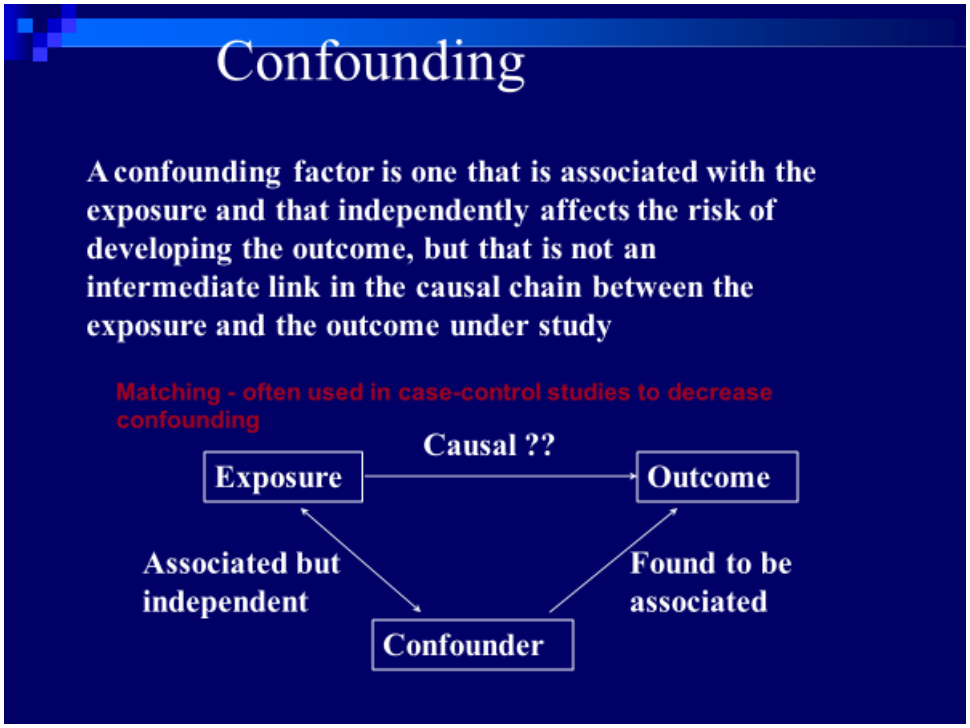
Matching Cases and Controls

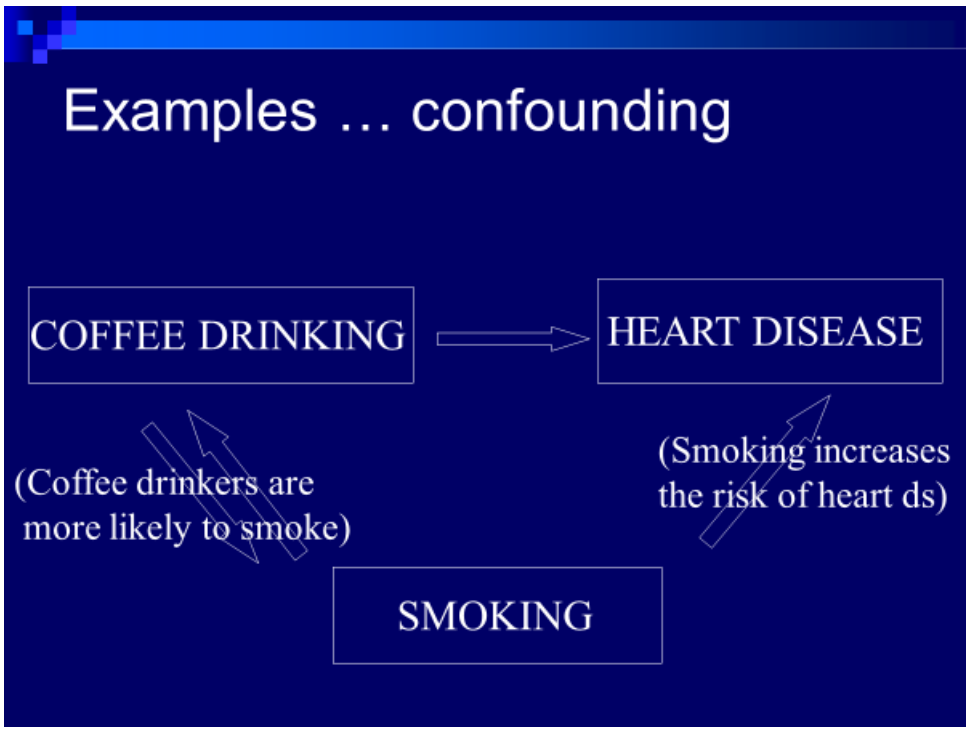
- **Matching is a popular approach to control for confounding and selection bias in case-control studies.**
- **Matching cases and controls helps to ensure that these groups are similar with respect to important risk factors, thereby making case-control comparisons less subject to confounding or selection bias.**

CASE-CONTROL STUDY DESIGN

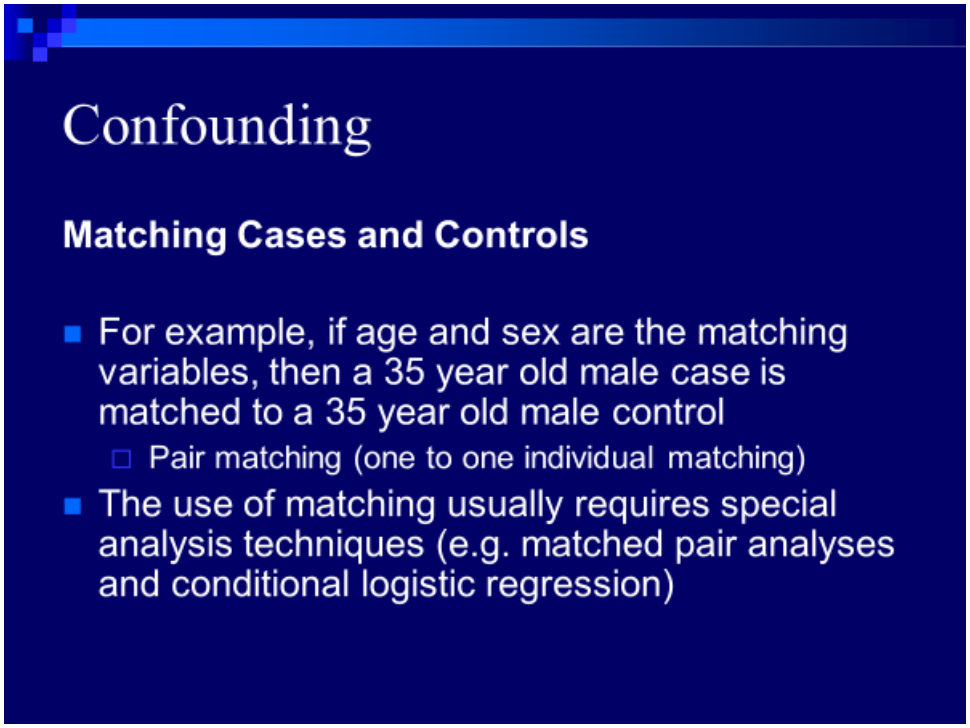
Prior exposure to the risk factor(s) of interest

- Once cases and controls are selected, information must be collected on prior exposure to the risk factor(s) of interest.
- Interviews and questionnaires are the most common means of determining a subject's exposure history and medical records review is another source
- The most objective means for characterizing exposure is the use of a biological marker.



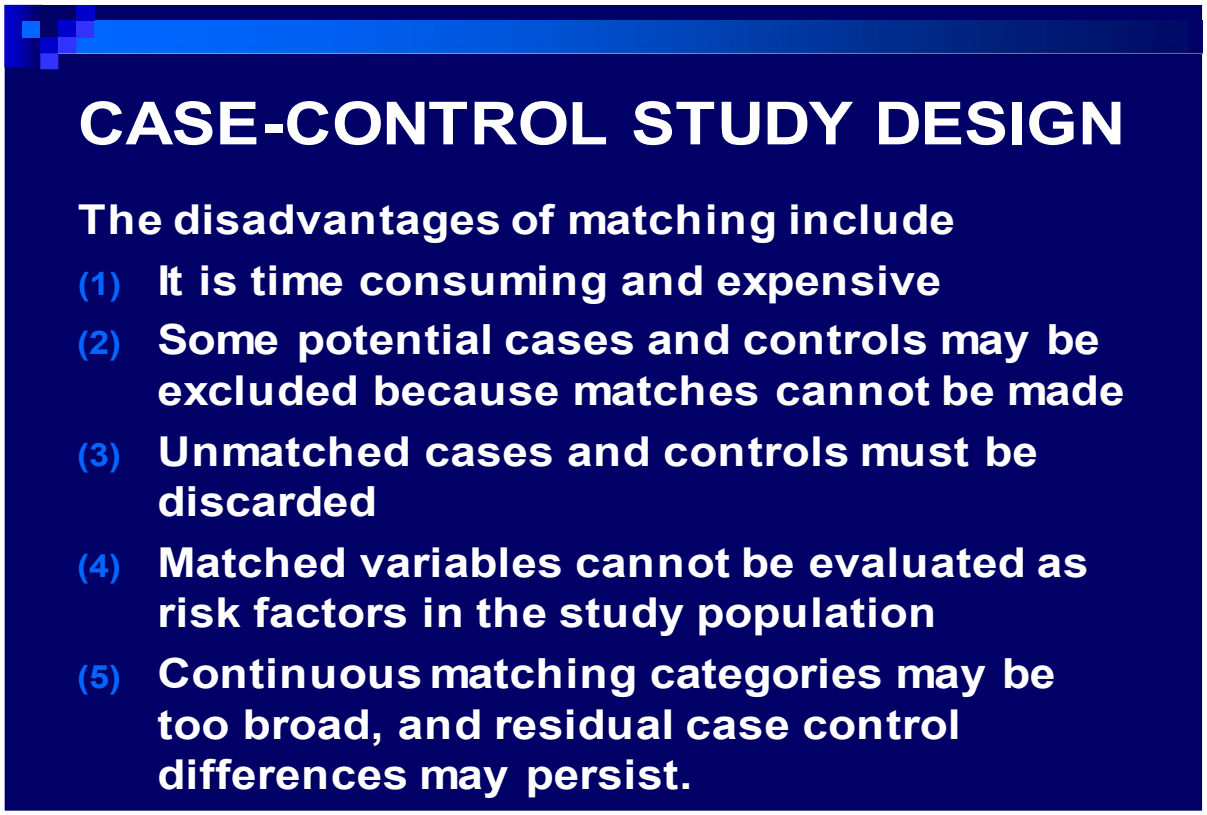


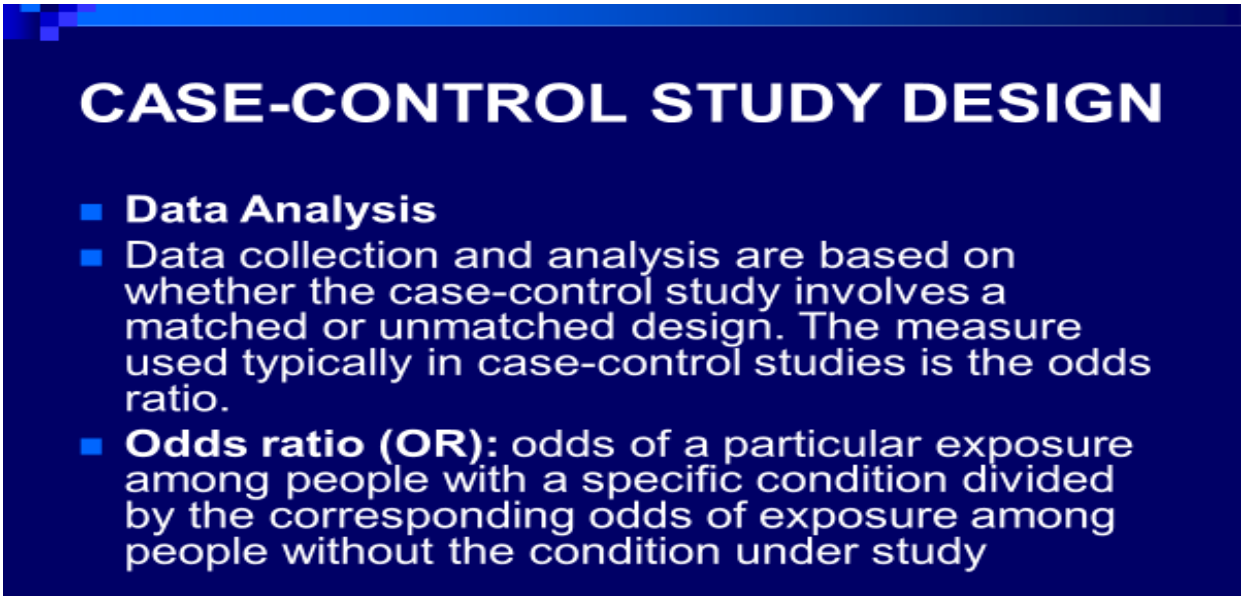
**for example here smoking affect coffee drinking and heart disease so, to avoid its effect I can choose both cases and controls from pt who are smoking so, the risk of smoking among cases and controls is equal so, I can study coffee drinking now.



**pair matching : take one from cases and match him with one person from controls.

matched pair analyses and هذه الطريقة تستخدم في دراسات معينة اسمها
conditional logistic regression





**odds ratio :

احتمالية اصابة الناس المعرضين لعامل خطر الى احتمالية اصابة الناس غير المعرضين له

$$OR = \frac{\text{Oddsof exposure}_{\text{cases}}}{\text{Oddsof exposure}_{\text{controls}}}$$

**so, if OR was >1 then the exposure of risk is assoiated with that disease.

<1 then exposure was protective.

So, in case control odds ratio

Cross sectional prevelance

Cohot study we calculate relative risk, absolute risk…by using follow up and incidence.

Analysis

- Find out
  - Exposure rates among cases and controls to suspected factor
  - Estimation of disease risk associated with exposure (Odds Ratio)

معنى الجملتين انه نحسب odds ratio في الامتحان ممكن تكتب الدكتورة الجملة من غير ما تحكي مباشرة احسب OR

Exposure rates

A case control study between smoking and lung cancer

	Cases (with Ca Lung)	Controls (without Ca lung)	Total
Smokers (<5/day)	33 (a)	55 (b)	88 (a+b)
Non-smokers	2 (c)	27 (d)	29 (c+d)
Total	35 (a+c)	82 (b+d)	117 (a+b+c+d)

Exposure rates

- Cases= a/(a=+c)= 33/35= 94.2 %
- Controls= b/(b+d)= 55/82= 67 %
- So frequency of smoking was definitely higher among lung cancer patients than those without cancer

لمعرفة الexposure rate

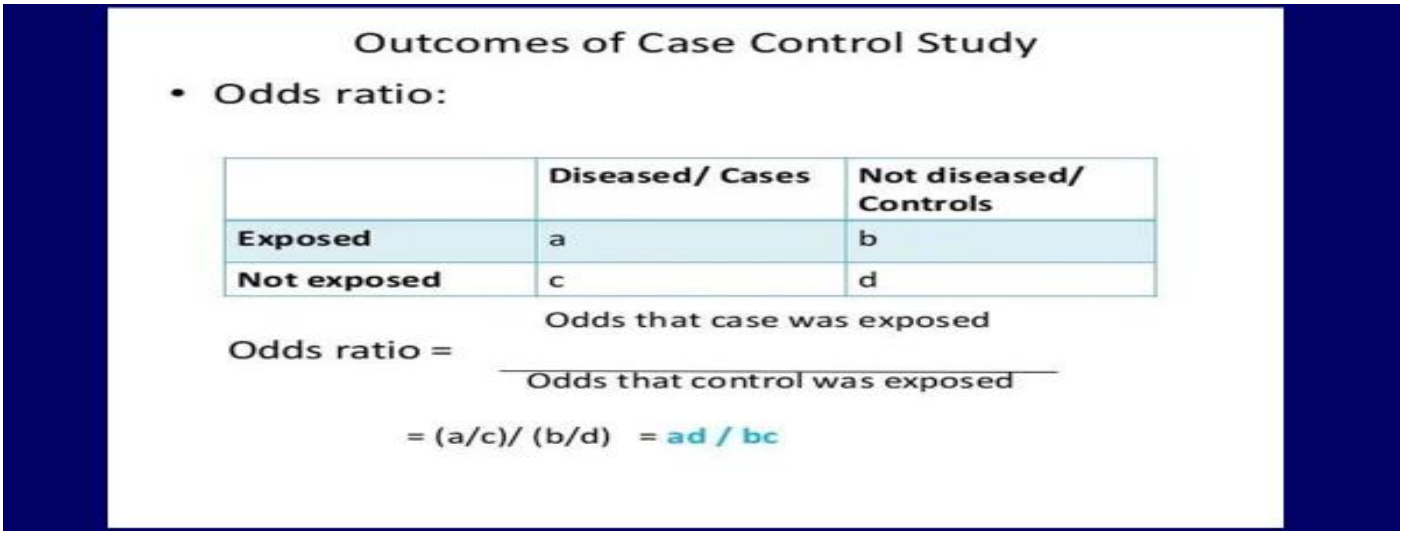
- exposed among cases= a\(a+c)

=33\(33+2)=.942 *100 =94.2 % (multiply by 100 to convert it into percent)

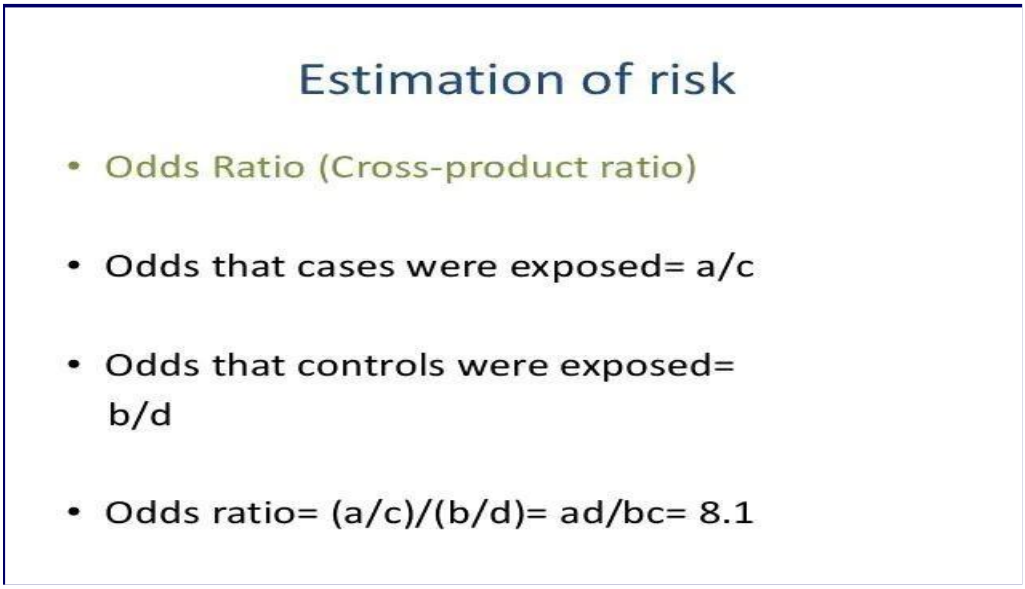
- بنعمل نفس الاشي لل controls

Exposure among controls=b\(b+d)

=55\(55+27)=67%



- كيف وصلنا لقانون انه ال odds ratio= ad\bc؟

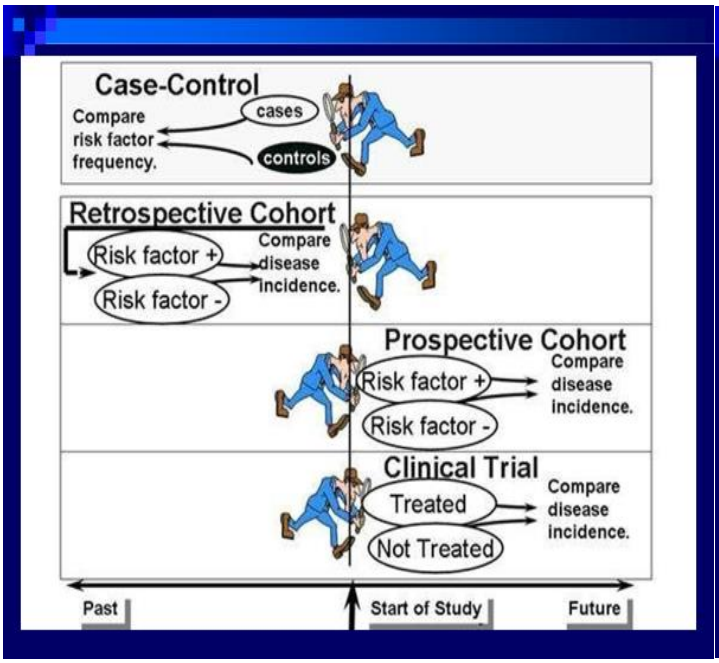


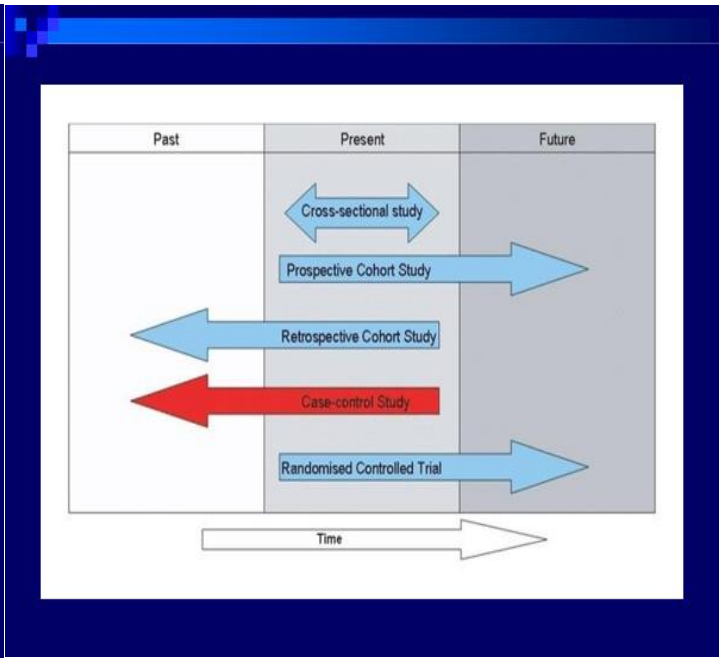
Interpretation

- The odds of smoking more than 5 cigarettes per day was 8.1 times more in the lung cancer patient than those without lung cancer.

OR

- Smoking (>5/day) was found be associated 8.1 times more in patients with lung cancer than those without lung cancer.





**as we can see in these two pictures :

Case control study and retrospective cohort study are going to past by asking pt about previous exposure.

Whereas prospective cohort and experimental study comparing if the pt will have ds in future or not like follow up to reach the results.