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Cohort Studies

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Lets start with this!

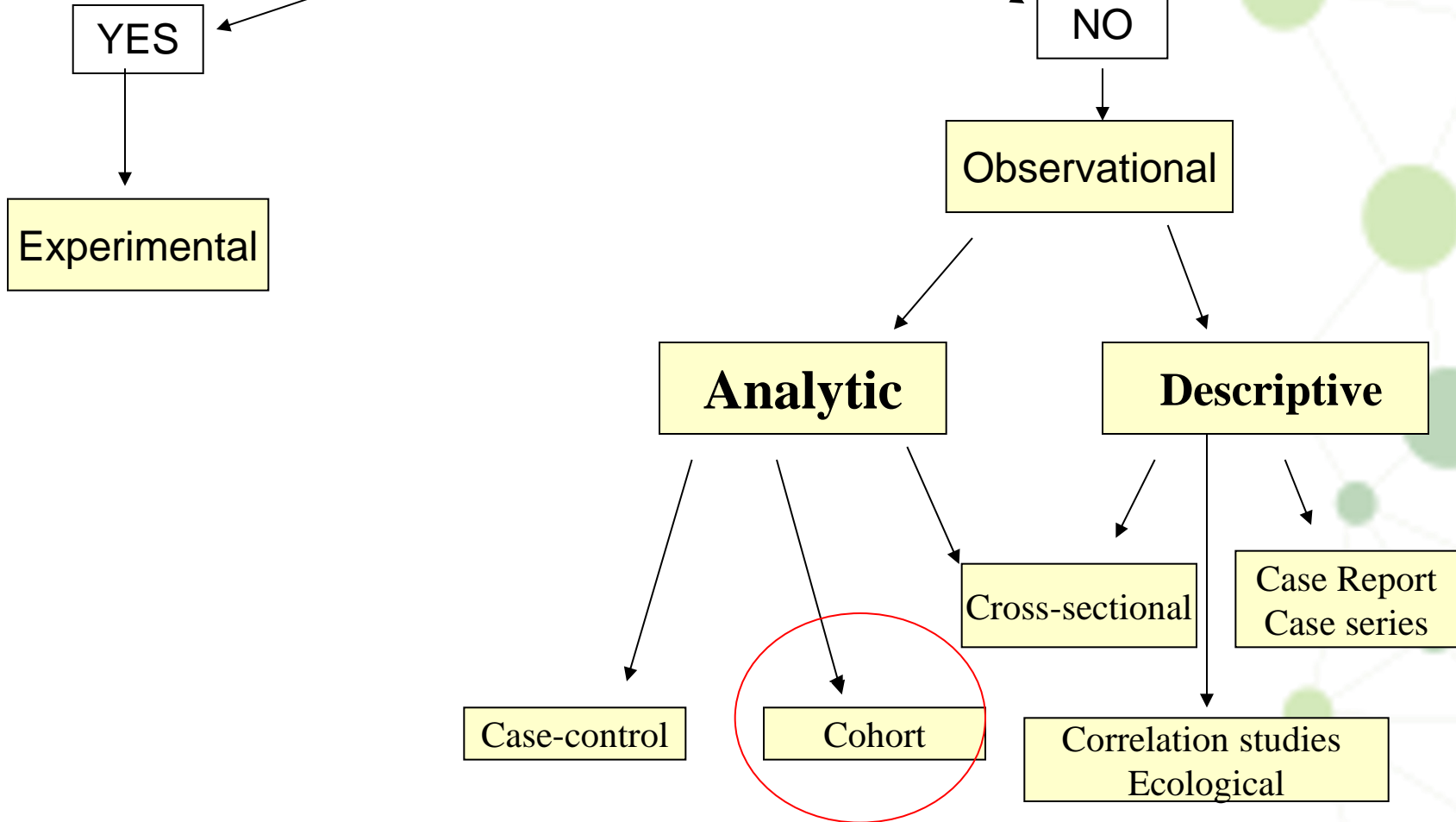
- Three professors (a physicist, a chemist, and a statistician) are called in to see their dean. Just as they arrive the dean is called out of his office, leaving the three professors there. The professors see with alarm that there is a fire in the wastebasket.
- The physicist says, "I know what to do! We must cool down the materials until their temperature is lower than the ignition temperature and then the fire will go out."
- The chemist says, "No! No! I know what to do! We must cut off the supply of oxygen so that the fire will go out due to lack of one of the reactants."
- While the physicist and chemist debate what course to take, they both are alarmed to see the statistician running around the room starting other fires. They both scream, "What are you doing?"
- The statistician replies, "Trying to get an adequate sample size."!!



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Epi Studies

Did the researcher assign exposure?





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Cross-sectional studies: Major limitation

- A major limitation of cross-sectional studies is difficulty in determining **if exposure or risk factor preceded the disease or outcome.**



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Cohort study!

- Cohort study: an observational study that involves tracking a group of people who don't have the outcome of interest over a period of time.
- So it is exploring part of natural history of risk factors or diseases in individuals.



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What is a cohort?

- Ancient Roman military unit, A band of warriors.
- Cohort: is a group of people who share a common characteristic or experience within a defined period.
- For example:
 1. Those who were born between 1980-1985
 2. Medical graduates between 2005-2010.
 3. Patients receiving certain medicine.





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Hallmark!

- The health data is obtained on the same individuals at more than one at a time not just once as in the cross-sectional study.
- The exposure is assessed at the baseline and the outcome at the follow up time
- Usually two groups are compared, an “exposed” and “unexposed” group.
- The unexposed group is called the referent group or comparison group.



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Synonyms

- Follow up study
- Longitudinal study
- Prospective
- Incidence study



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Cohort studies made easy!

1. Start with a population at risk (study base)



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The study base

- The “study base” is a population of individuals, each carrying the burden of personal and group risk factors.





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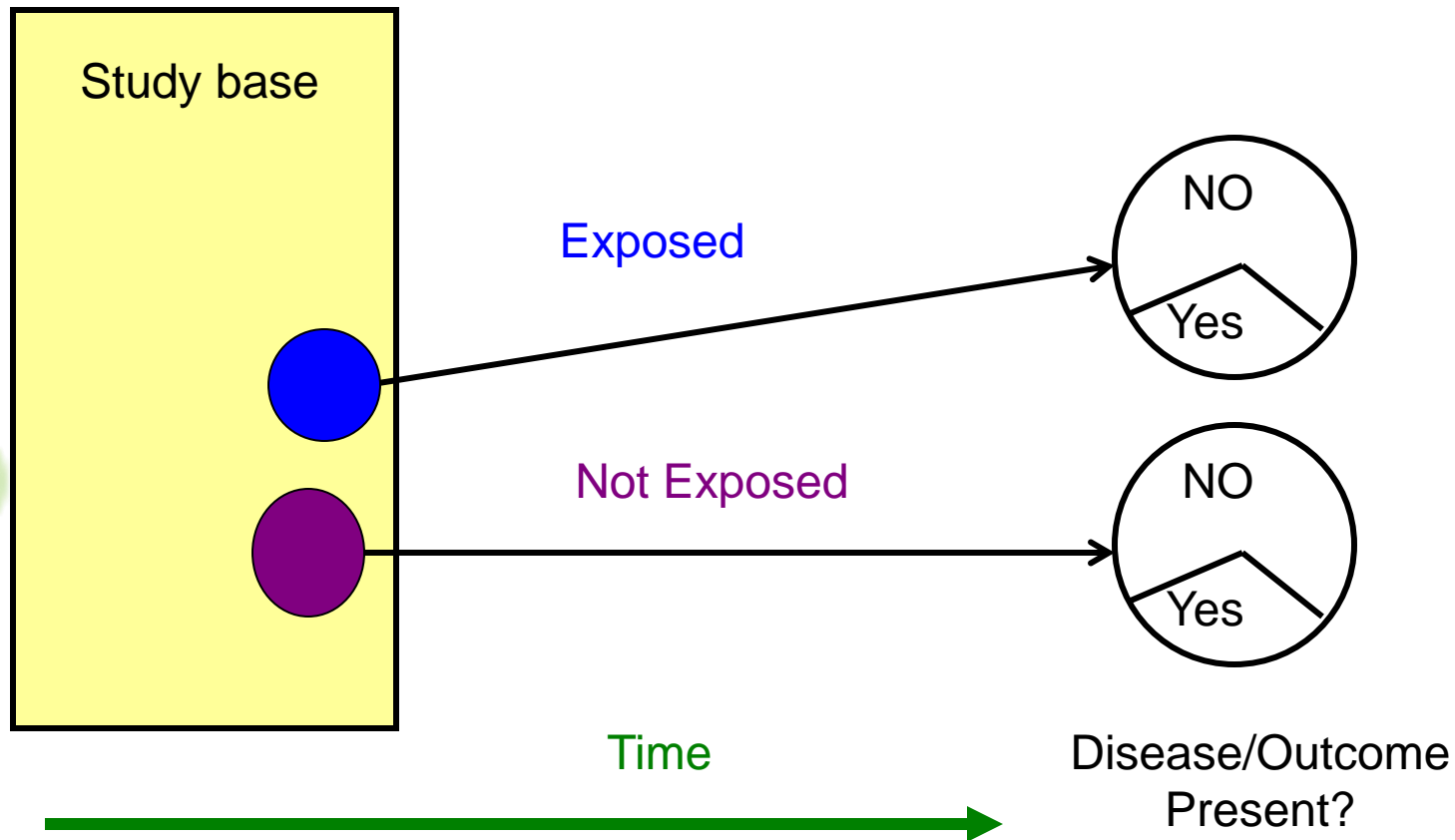
Cohort studies made easy!

1. Start with a population at risk (study base)
2. Measure characteristics at baseline
3. Follow-up the population over time
4. Compare outcome rates in people with and without exposure



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General Design





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Selection of exposure

1. The hypothesis being tested,
2. The exposure frequency, and
3. Feasibility considerations such as the availability of records and ease of follow-up



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Measurement of exposure

- ✓ Criteria for exposure definition should lead to accurate classification of exposed and unexposed subjects
- ✓ Efficient and accurate sources should be used to identify exposure status



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Measuring the outcome

- ✓ You must determine endpoints in a similar manner for both the exposed and the non-exposed
 - **That is, procedures for disease identification must be the same for the exposed and the non-exposed**
- ✓ Define the outcomes of interest (set diagnostic criteria)
 - **If you are looking for multiple outcomes, each must be defined**



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Sources of Information

- Pre-existing records .
- interviews
- Direct physical examinations
- laboratory tests or biological specimens.



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- Whatever the source of information, it is important to **use the same** procedures for obtaining information on the exposed and unexposed groups.



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Lets complicate it !

- There are three different types of cohort studies:
 1. Prospective cohort
 2. Retrospective cohort (historical)
 3. Ambi-directional!(mixed)



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Prospective

2014

Study participants

Exposed

Not Exposed

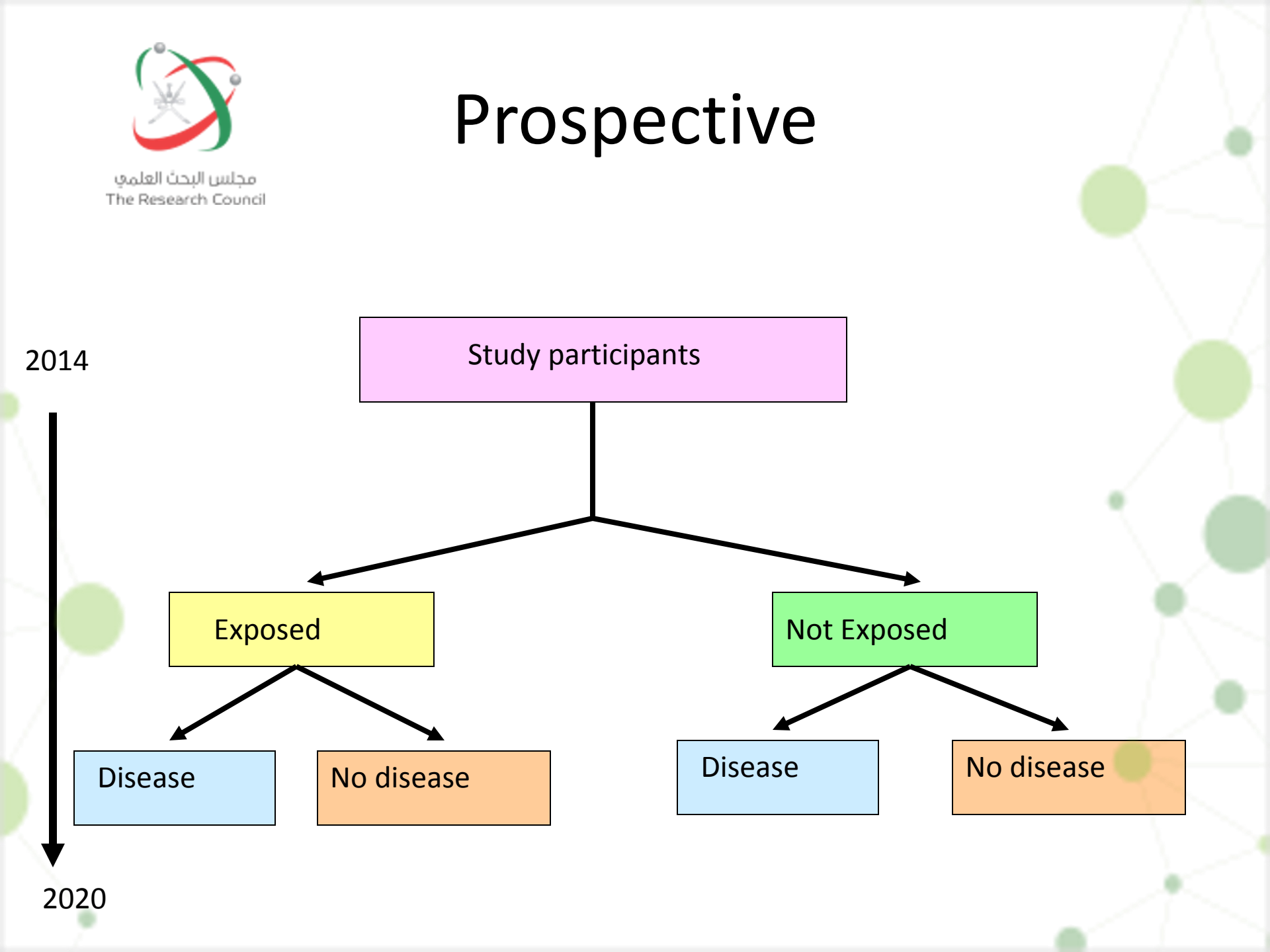
Disease

No disease

Disease

No disease

2020





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Retrospective

1990

Study participants

Exposed

Not Exposed

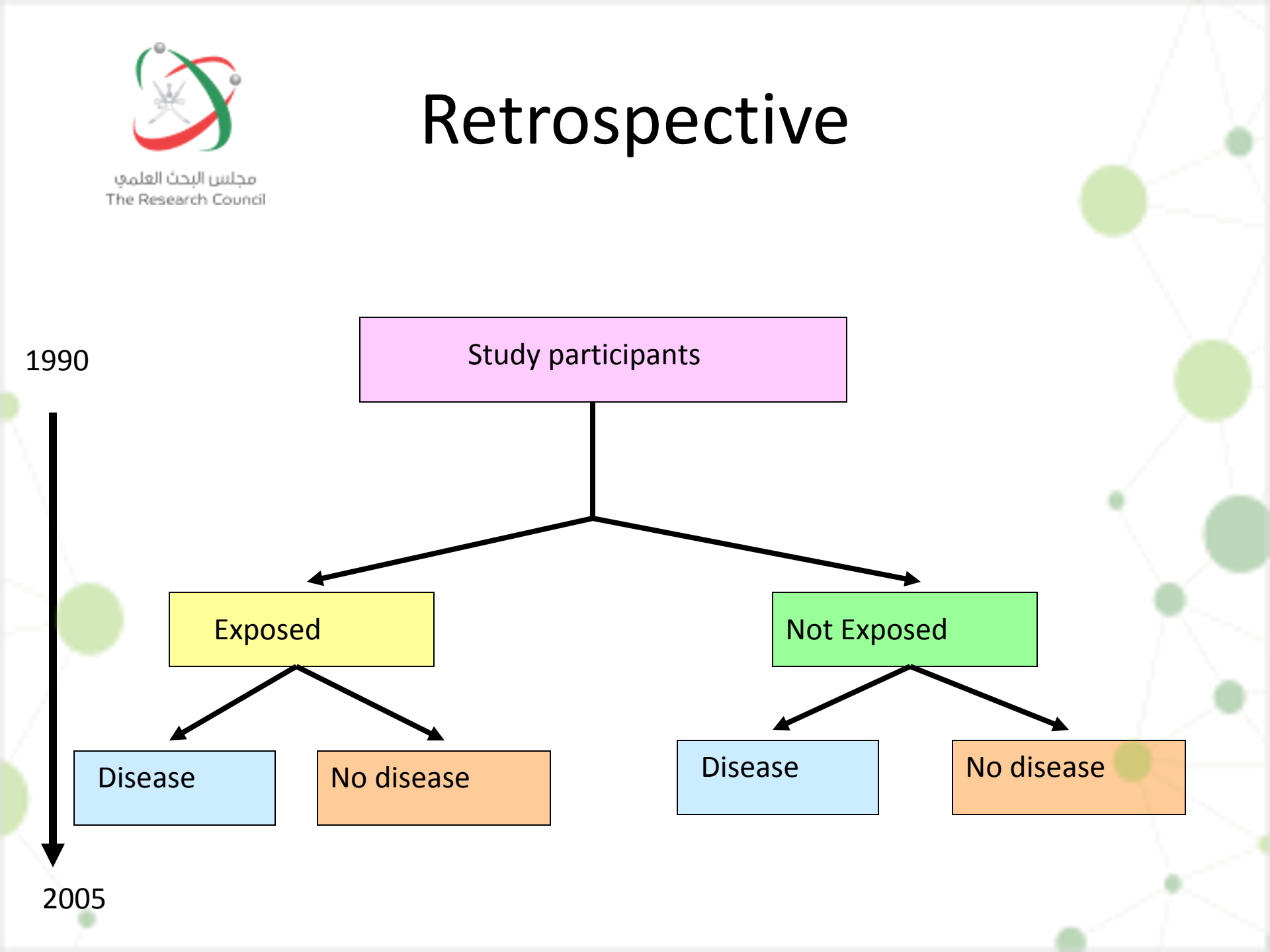
Disease

No disease

Disease

No disease

2005





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Ambi-directional

2000

Study participants

Exposed

Not Exposed

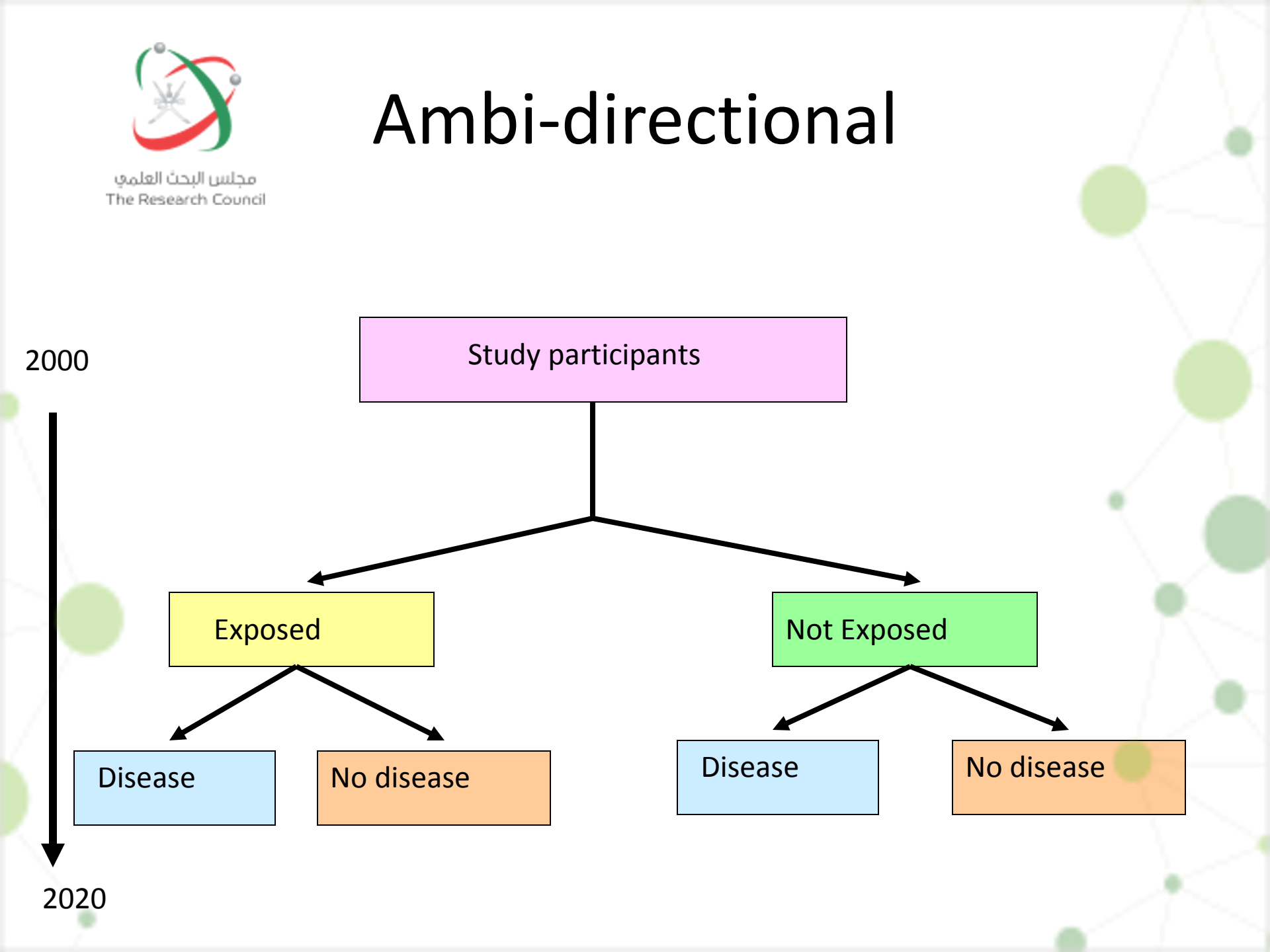
Disease

No disease

Disease

No disease

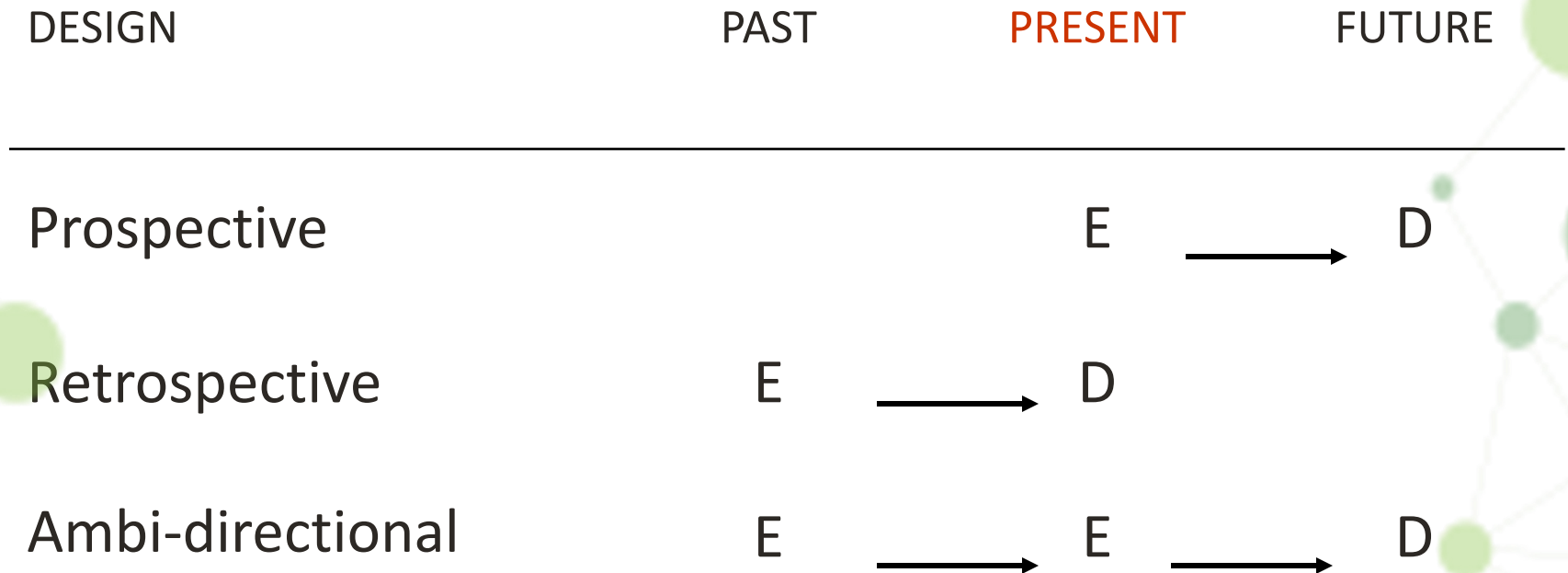
2020





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Type of the cohort



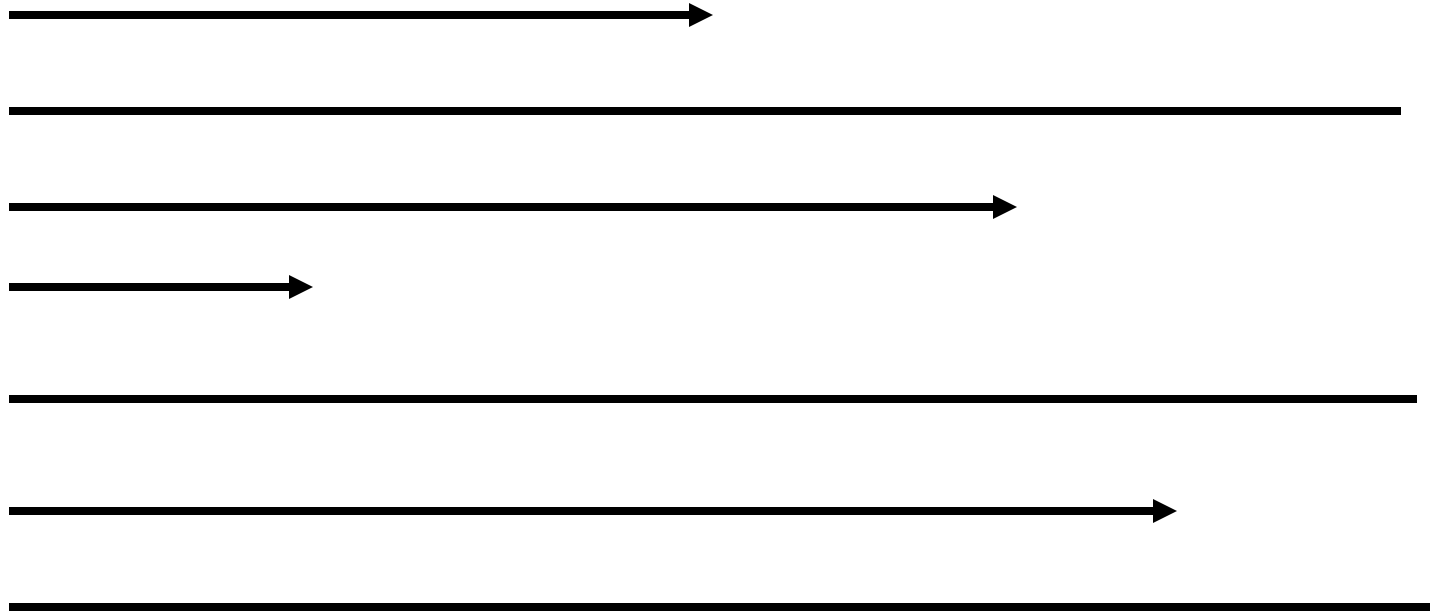
Another classification: Open Vs. Closed

- Open: people moving in and out (dynamic)
- Closed: fixed population



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closed cohort: the same follow up time



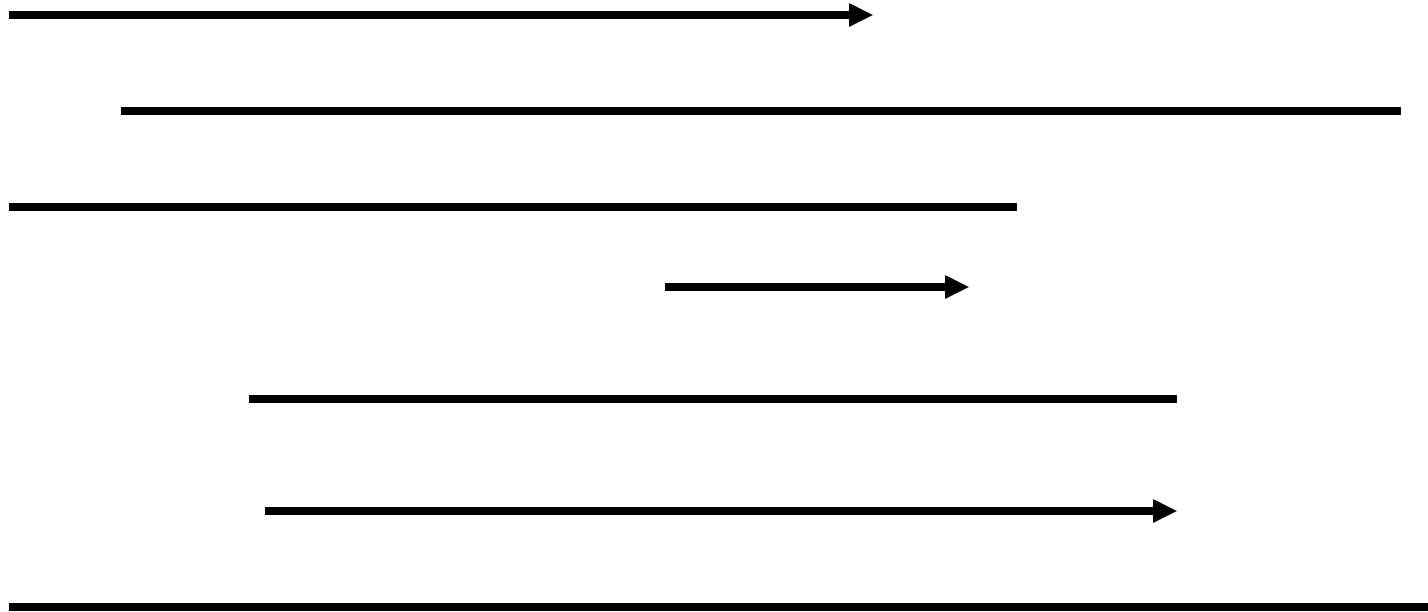
Start

End



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Open Cohort: different follow up time



Start

End



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Strengths of Cohort Studies

- Efficient for rare exposures.
- Can evaluate multiple effects of an exposure
- If prospective, good information on exposures, less vulnerable to bias, and clear temporal relationship between exposure and disease



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Limitations

- Inefficient for rare outcomes
- If retrospective, poor information on exposure and other key variables, more vulnerable to bias
- If prospective, expensive and time consuming, inefficient for diseases with long induction and latent period



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Another Limitation

- ✓ Nonparticipation (selection bias) –
Sometimes it cannot be assumed that those who chose to participate had the same incidence of disease as those who did not participate



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Yes ..It can!

Can be large or small

Can be long or short

Can be simple or elaborate

Can be local or multinational



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Thank you

HOW DO WE GET IT BEFORE IT GETS US?

