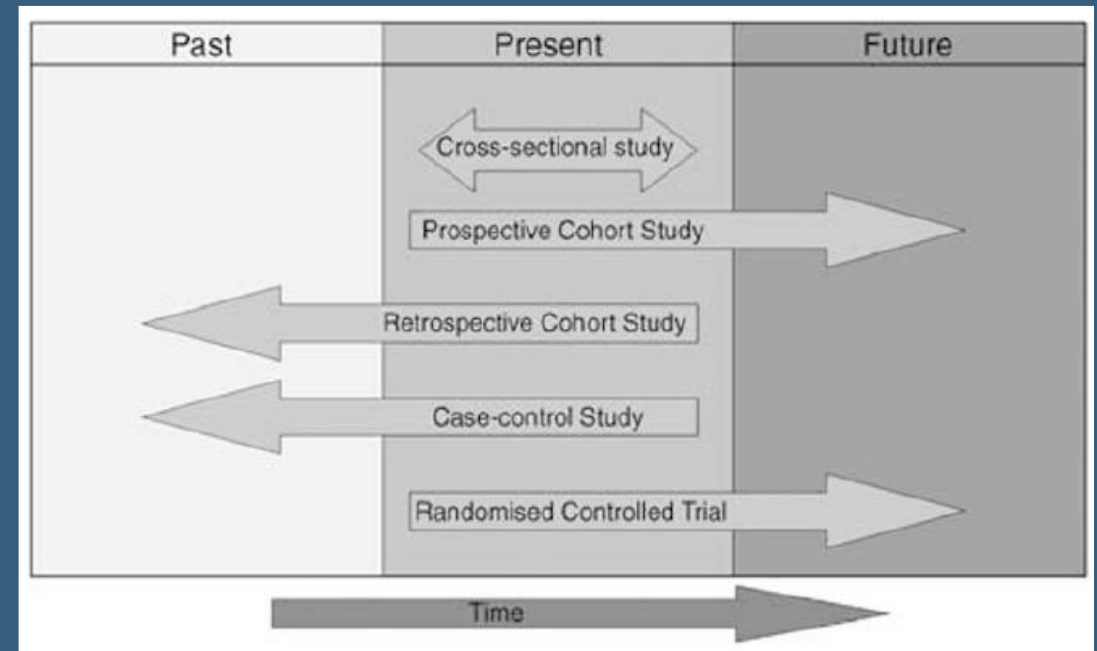


LIFE SCI 2A03

**Module 4:
Clinical SC
Research**

**Lecture 1:
Overview of
Clinical Studies**

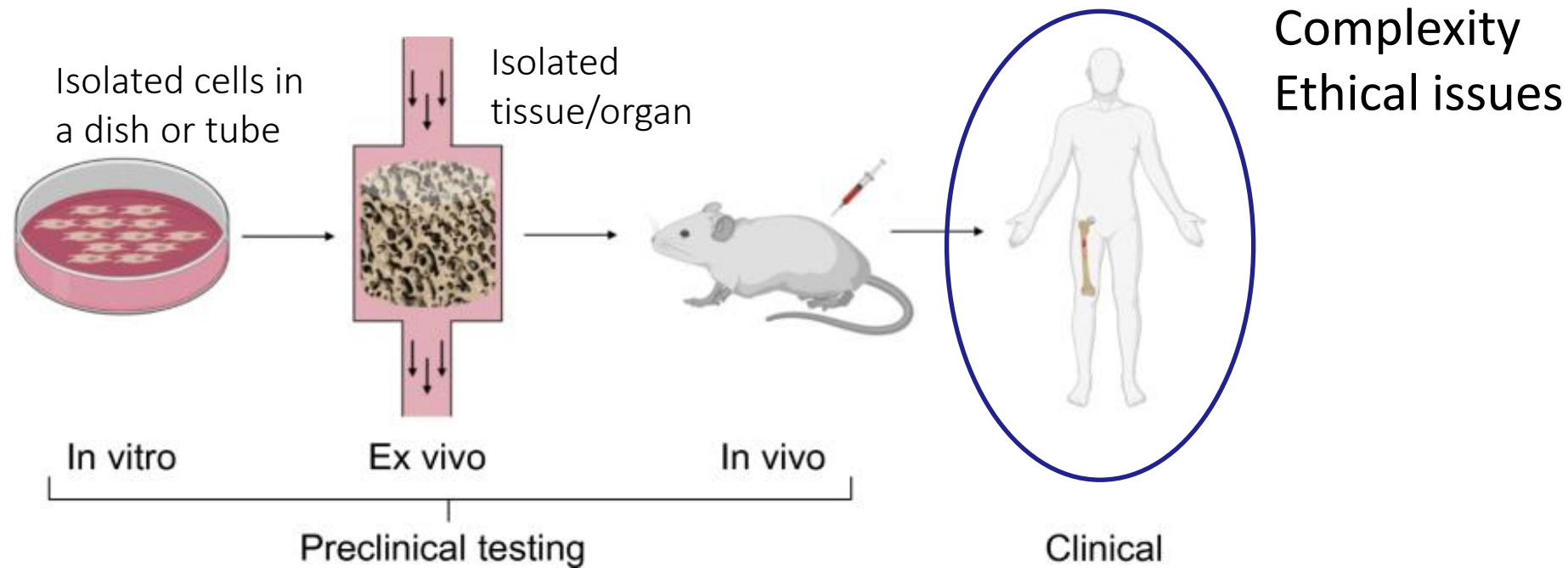


LEARNING OBJECTIVES



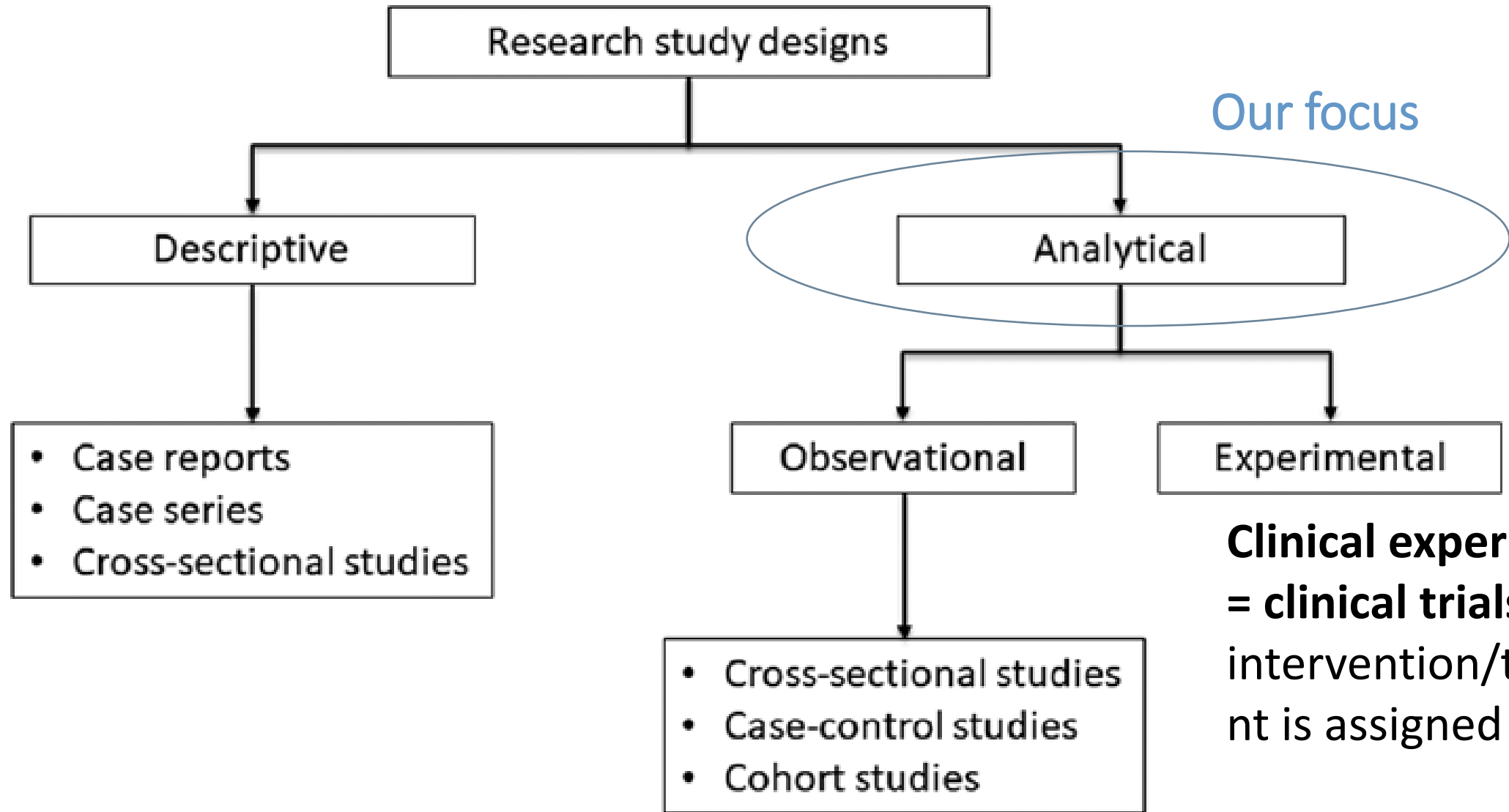
- *Explain the main goal of clinical studies*
- *Identify different types of clinical research studies and their key characteristics*
- *Explain advantages and disadvantages of each type*

PRE-CLINICAL VS. CLINICAL - RECAP



WHY CLINICAL STUDIES?

- Gain medical knowledge related to:
 - Prevention of development of diseases/conditions or recurrence
 - Diagnosis
 - Treatment
 - Palliative/supportive care (symptom management)



Poll Question 1

There is a poll question in the copy of lecture notes
posted in echo360

SOME (LOOSE) TERMINOLOGY

“**exposure**” (predictor or risk factor) = independent variable is ‘naturally’ determined (NO intervention from researcher)

- e.g. age, sex, smoking, educational status

“**intervention**” (treatment) = independent variable assigned to participants by researcher

- e.g. administration of a drug or vaccine, performance of a diagnostic or therapeutic procedure, introduction of an educational tool

COHORT STUDIES

- Longitudinal
- P or R
- Subjects assigned to groups **by exposure**
- Good to measure **incidence of disease**
- Report **Risk Ratio (RR)** from incidences

Cohort = subjects followed over time to evaluate the occurrence of an outcome

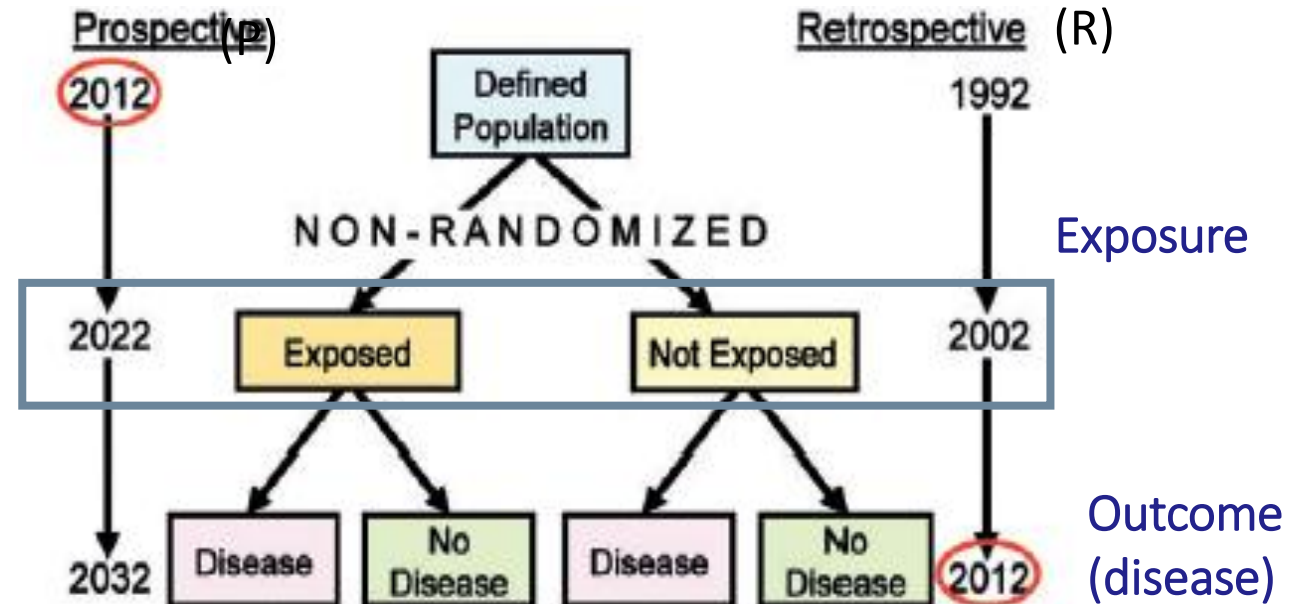
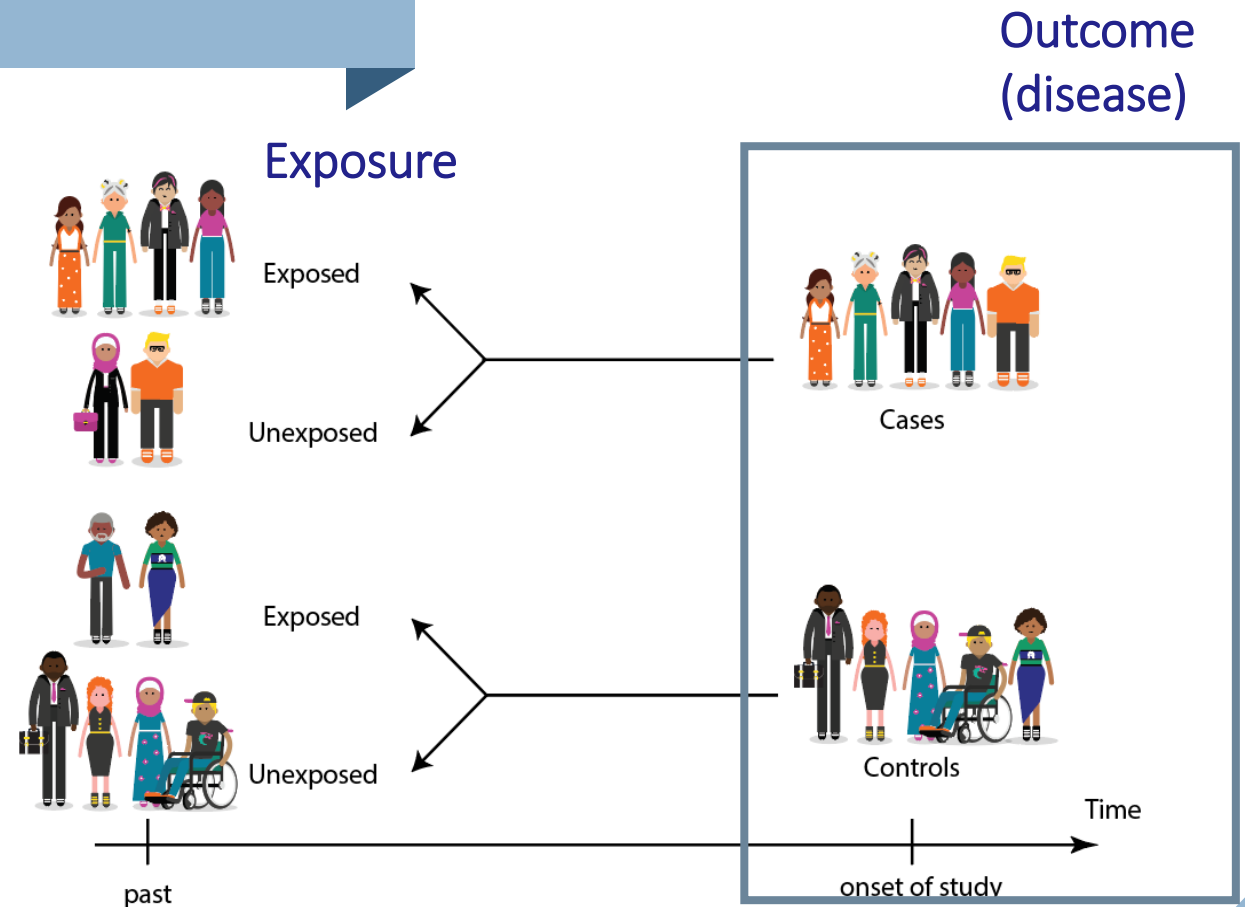


Figure 9-8. Time frames for a hypothetical prospective cohort study and a hypothetical retrospective cohort study begun in 2012.

CASE-CONTROL STUDIES

- Longitudinal
- R (99%)
- Subjects assigned to groups **by outcome**
 - **rare disorder/disease**
- Report **Odds Ratio (OR)**



CROSS-SECTIONAL STUDIES

- Carried out at one time point (or over a very short period)
- Measure exposure and outcome at the same time
- Measure **prevalence** of disease
- Report **Risk Ratio (RR)** from prevalence



CLINICAL TRIALS (CTs)

- Participants receive **interventions** based on researcher's protocol (experimental)
- Designed to assess **the safety and therapeutic effect** of interventions (e.g. drugs, devices, procedures, changes to participants' behavior such as diet)
- PROSPECTIVE
- Provides the strongest evidence of cause-effect relationships
- RR (treatment vs. control or new treatment vs. standard treatment)

Poll Question 2

There is a poll question in the copy of lecture notes
posted in echo360

RR vs. OR

- Measures of association or effect**

$RR = R_{\text{event in exposed}} / R_{\text{event in non-exposed}}$

$OR = O_{\text{exposure in cases}} / O_{\text{exposure in controls}}$
 $= O_{\text{event in exposed}} / O_{\text{event in non-exposed}}$

- Obtained with logistic/statistical models (and can do so while controlling for confounders)
- Not the same!**
 \approx when event (disease) is very rare

R = P event (from all possible outcomes)

O = P of event/ P of event not occurring

event = outcome of interest (disease, death, etc.)

		Disease	
		yes	no
Exposed	yes	a	b
	no	c	d

$$RR = \frac{I_1}{I_0} = \frac{\frac{a}{a+b}}{\frac{c}{c+d}} \xrightarrow{\text{if } a, c \text{ small}} \approx \frac{\frac{a}{b}}{\frac{c}{d}} = OR$$

Schmidt et al (2008). Int J Public Health 53:165–167

<https://www.ncbi.nlm.nih.gov/books/NBK431098/#:~:text=Thus%20the%20Odds%20ratio%20is,the%20disease%20is%20more%20common.>

RR and OR - INTERPRETATION

- **> 1 (and $P < 0.05$ and/or confidence interval (CI) does NOT include 1) → increase in R (or O) in exposed (or new treatment) group**
- **< 1 (and $P < 0.05$ and/or confidence interval (CI) does NOT include 1) → decrease in R (or O) in exposed (or new treatment) group**

Table 1: A randomized trial of sclerotherapy versus ligation for esophageal varices (hypothetical data)

Intervention	Outcome		Total
	Death	Survival	
Ligation	18	46	64
Sclerotherapy	29	36	65
Total	47	82	129

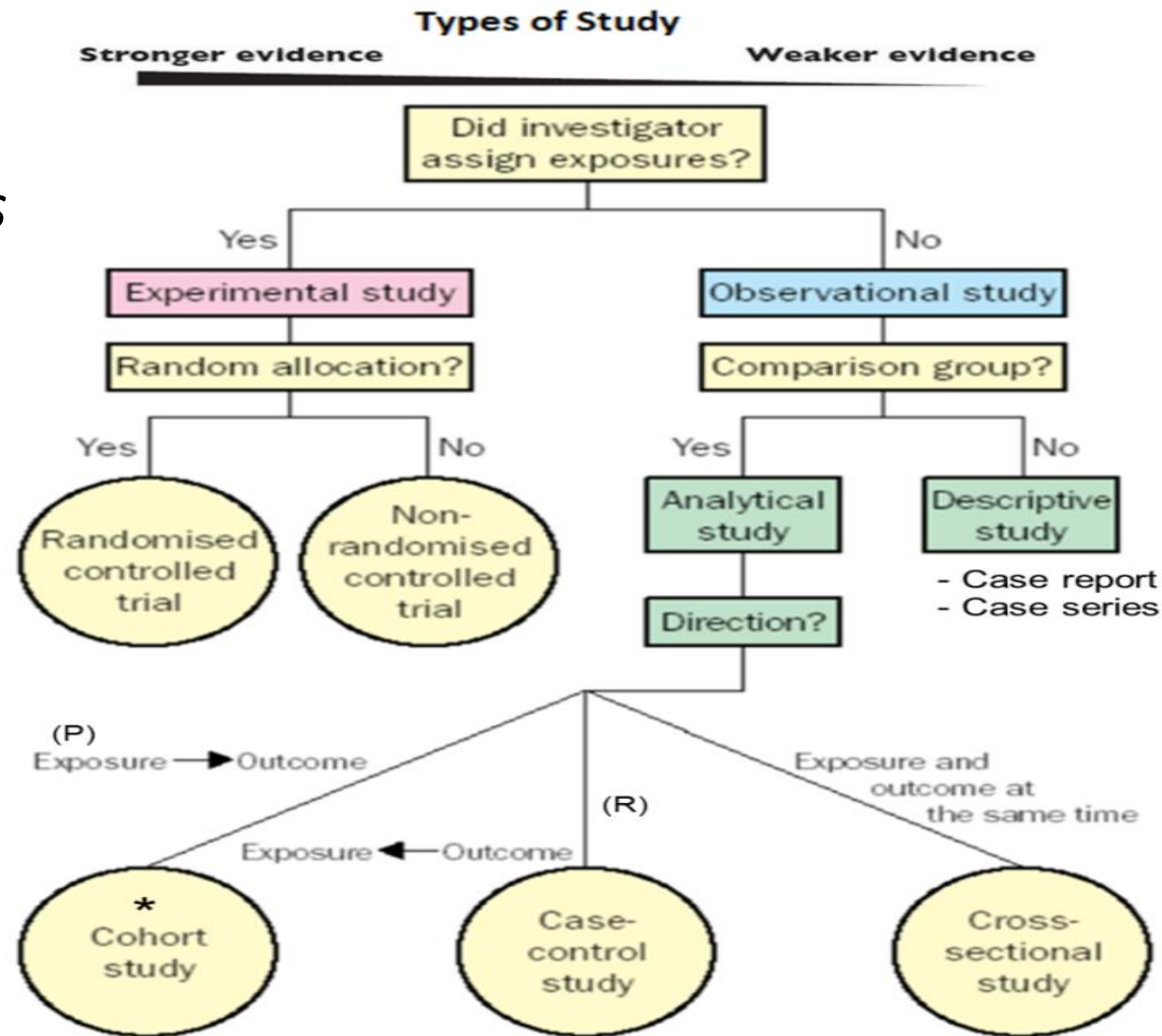
RR of death in ligation group vs. sclerotherapy group = $18/64 / 29/65 = 0.28/0.44 = 0.63$
CI = [0.45-0.8] ($p < 0.05$)

→ risk of death after ligation is 63% of the risk of death after sclerotherapy → ligation decreases the risk of death by 37%

CLINICAL STUDIES - SUMMARY

Humans as subjects!

different phases



(From Grimes and Schulz, *Lancet* 2002; 359: 57-61)

NEXT IN LIFE SCI 2A03

- Thursday: regular in-person office hours
- **UPDATE: Friday: additional VIRTUAL office hours: 5-6 pm (DR VGRM Office hours channel)**