

Biostatistics

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Continuous



Categorical

Appropriate Statistical Analysis for Various Situations		
Type of Data	Comparing 2 Groups	Comparing > 2 Groups
Categorical or ordinal or binary	Chi-Square	Chi-Square
Interval or continuous nonparametric (not normal)	Mann-Whitney U; Wilcoxon	Kruskal-Wallis
Continuous or interval parametric (normal) (Comparing different or independent samples)	Unpaired T-test	One-way analysis of variance
Continuous or interval parametric (normal) (Comparing the same sample - before and after an intervention)	Paired t-test	Two-way analysis of variance

Exposure Status	Event Occurred	
	Yes	No
Exposed	a	b
Not Exposed	c	d



Relative risk reduction = 1 – Relative Risk

$$\text{Relative Risk} = \frac{a / (a + b)}{c / (c + d)}$$

Absolute risk reduction (ARR) = $c / (c + d) - a / (a + b)$

$$\text{Odds Ratio} = \frac{a / b}{c / d} = \frac{ad}{cb}$$

Number needed to treat = 1/ARR



	Disease Positive	Disease Negative	
Test Positive	True positive (TP)	False positive (FP)	PPV = TP / (TP + FP)
Test Negative	False negative (FN)	True negative (TN)	NPV = TN / (TN + FN)
	Sensitivity = TP / (TP + FN)	Specificity = TN / (TN + FP)	

SeNsitivity
“SNOUT”

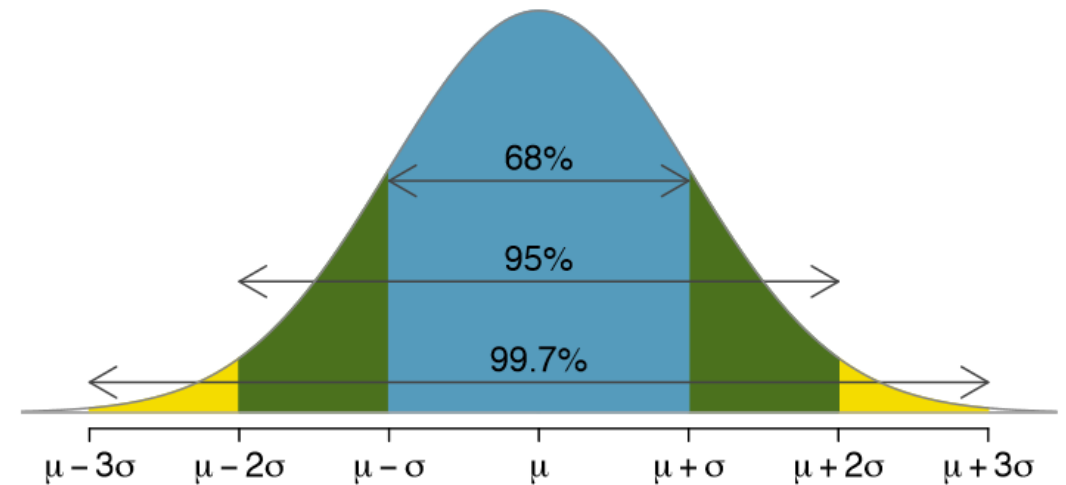
SPecificity
“SPIN”

Null hypothesis = there is no statistically significant difference between groups ($p > 0.05$)

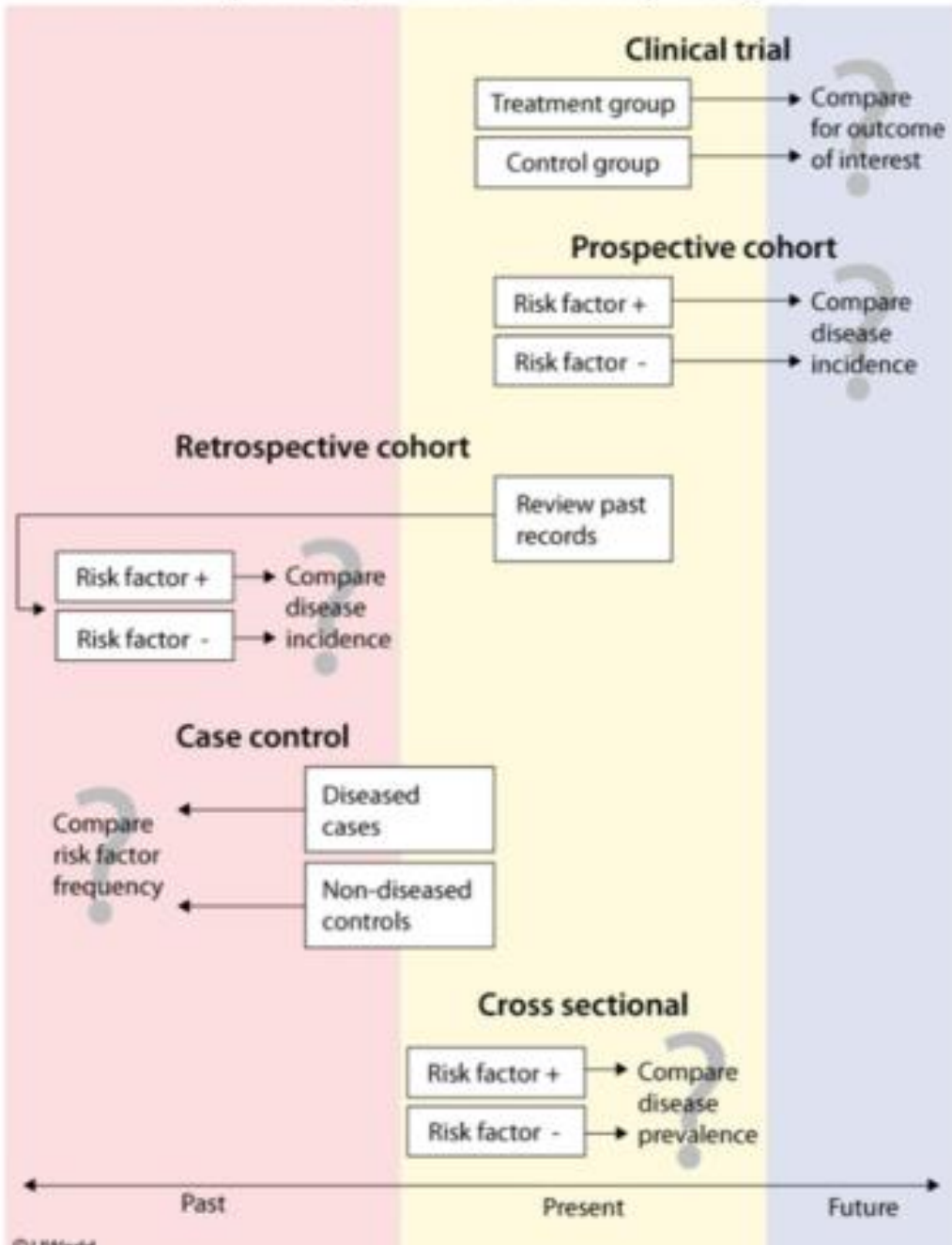
Type II = Beta

Power = 1 - Beta

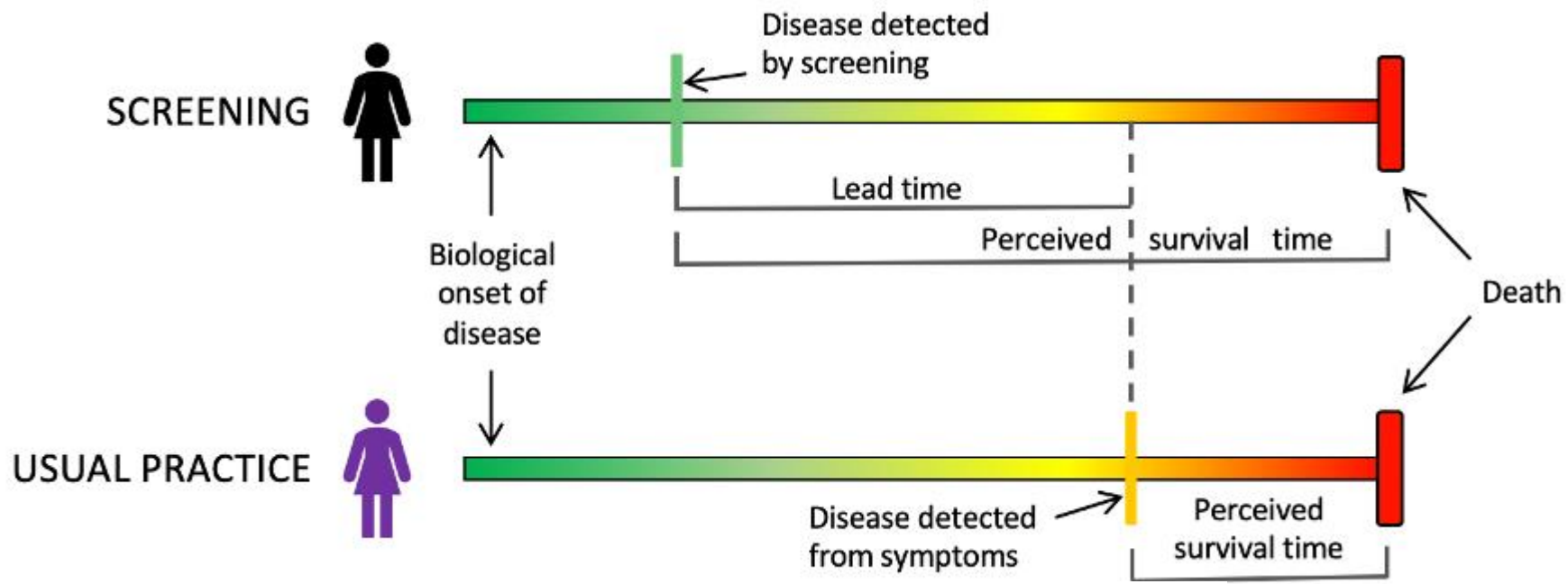
	Null Hypothesis is TRUE	Null Hypothesis is FALSE
Rejection of Null Hypothesis	False positive (Type I error) ONE truth and it's rejected	True positive
Failure to Reject Null Hypothesis	True negative	False negative (Type II error)



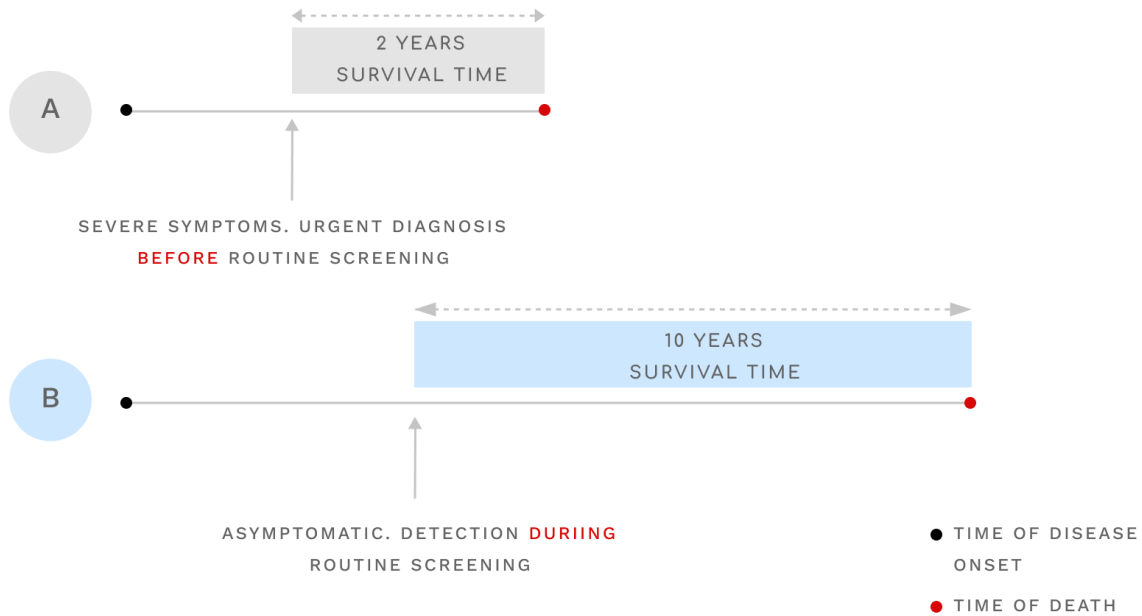
Temporality of different study designs



Case-control = Odds ratio = Outcome



LENGTH TIME BIAS



How does a clinical trial work?

~~Cancer~~[®]

Clinical trials occur in four phases, and each phase has a different purpose.

Phase I



Focus on **safety** and the proper dose.

15 to 50 patients

Phase II



Focus on **effectiveness** and side effects.

Less than 100 patients

Phase III



Compares the **new treatment** to existing treatment.

Hundreds of people

Phase IV



Treatment is **approved and available**. Long-term effects are observed.

Thousands of people