The Odds Ratio of Dz

	Dz	Non Dz
Exposed	A	B
Not Exposed	C	D

Odds = p / (1-p)

The probability of having the disease among those exposed is A / (A+B)

The Odds of having the disease among those exposed =

$$\frac{\text{P (Dz among exposed)}}{\text{1-P (Dz among exposed)}}$$

Plugging in:
Odds of having the Dz among exposed = [A / (A+B)] / {1- [A / (A+B)]} = A / B

Similarly,
The Probability of having the Dz among those not exposed is C / (C+D)

The Odds of having the Dz among those not exposed =

$$\frac{\text{P (Dz among those not exposed)}}{\text{1-P (Dz among those not exposed)}}$$

Plugging in:
Odds of having the Dz among not exposed = [C / (C+D)] / {1- [C / (C+D)]} = C / D

The ODDS RATIO of Dz (or the Ratio of the Odds of Dz) =

$$\frac{\text{Odds of Dz among exposed}}{\text{Odds of Dz among not exposed}}$$

Plugging in, OR = [A / B] / [C / D] = A*D / B*C = AC*BD

95% Confidence Interval (CI) for the OR, testing H_O: OR=1 H_A: OR≠1

$$\textbf{Lower 95\% CI of OR} = e^{\ln(OR)-1.96\sqrt{\frac{1}{A}+\frac{1}{B}+\frac{1}{C}+\frac{1}{D}}}$$

$$\textbf{Upper 95\% CI of OR} = e^{\ln(OR)+1.96\sqrt{\frac{1}{A}+\frac{1}{B}+\frac{1}{C}+\frac{1}{D}}}$$

The Odds Ratio of Exposure

	Exposed	Not Exposed
Cases	A	B
Controls	C	D

Odds = p / (1-p)

Probability of having been exposed among cases = A / (A+B)

The Odds of having been exposed among cases =

$$\frac{\text{P (having been exposed among cases)}}{\text{1-P (having been exposed among cases)}}$$

Plugging in:
Odds of having been exposed among cases = [A / (A+B)] / {1- [A / (A+B)]} = A / B

Similarly,
The Probability of having been exposed among controls = C / (C+D)

The Odds of having been exposed among controls =

$$\frac{\text{P (having been exposed among controls)}}{\text{1-P (having been exposed among controls)}}$$

Plugging in:
Odds of having been exposed among controls = [C / (C+D)] / {1- [C / (C+D)]} = C / D

The Case-Control ODDS RATIO (or the Ratio of the Odds) =

$$\frac{\text{Odds of having been exposed among cases}}{\text{Odds of having been exposed among controls}}$$

The ODDS RATIO of Exposure: OR = [A / B] / [C / D] = A*D / B*C = AC*BD

95% Confidence Interval (CI) for the OR, testing H_O: OR=1 H_A: OR≠1

$$\textbf{Lower 95\% CI of OR} = e^{\ln(OR)-1.96\sqrt{\frac{1}{A}+\frac{1}{B}+\frac{1}{C}+\frac{1}{D}}}$$

$$\textbf{Upper 95\% CI of OR} = e^{\ln(OR)+1.96\sqrt{\frac{1}{A}+\frac{1}{B}+\frac{1}{C}+\frac{1}{D}}}$$