

# Generalised Linear Models - Introduction

# Why Generalised Linear Models (GLMs)?

Linear models suppose that we have observations

$$Y \sim N(X\beta, \sigma^2 I).$$

Can we use linear models for genetic case-control study?

**Table:** Data: Type 2 Diabetes example

Sample id	$Y_i$	$X_i$
1	type 2 diabetes	CC
2	no type 2 diabetes	CC
3	no type 2 diabetes	CT
4	no type 2 diabetes	TT
...	...	...
2000	type 2 diabetes	CC

$Y_i$  :    no type 2 diabetes     $\rightarrow$     0  
                 type 2 diabetes     $\rightarrow$     1

$X_i$  :    CC     $\rightarrow$     0  
         CT     $\rightarrow$     1  
         TT     $\rightarrow$     2

GLMs allow for non-normal  $Y$ !

# Generalised Linear Models - Outline

- Binomial regression
- Exponential families
- Generalised linear models (GLMs)
- Quasilikelihood and overdispersion