

GAS Power Calculator Relevant Equations

GAS Power Calculator Copyright 2016 Jennifer Li Johnson

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http://csg-old.sph.umich.edu//abecasis/CaTS/gas_power_calculator/index.html

$$AAfreq = (DAF)^2 \quad (1)$$

$$ABfreq = 2 * (DAF) * (1 - DAF) \quad (2)$$

$$BBfreq = (1 - DAF)^2 \quad (3)$$

$$AAprb = \frac{(GRR)^2 * prev}{(GRR)^2 * AAfreq + GRR * ABfreq + BBfreq} \quad (4)$$

$$ABprob = \frac{GRR * prev}{(GRR)^2 * AAfreq + GRR * ABfreq + BBfreq} \quad (5)$$

$$BBprob = \frac{prev}{(GRR)^2 * AAfreq + GRR * ABfreq + BBfreq} \quad (6)$$

$$casesDAF = \frac{AAprb * AAfreq + ABprob * ABfreq * 0.5}{prev} \quad (7)$$

$$controlsDAF = \frac{(1 - AAprb) * AAfreq + (1 - ABprob) * ABfreq * 0.5}{1 - prev} \quad (8)$$

$$Vcases = casesDAF * (1 - casesDAF) \quad (9)$$

$$Vcontrols = controlsDAF * (1 - controlsDAF) \quad (10)$$

$$ncp = \frac{casesDAF - controlsDAF}{\sqrt{(\frac{Vcases}{cases} + \frac{Vcontrols}{controls}) * 0.5}} \quad (11)$$

$$C = -ninv(\alpha * 0.5) \quad (12)$$

$$P = ndist(-C - ncp, false) + ndist(C - ncp, true) \quad (13)$$

Notes:

- Invalid model if AAprb > 1
- Vcases: Cases Variance
- Vcontrols: Controls Variance
- ncp: noncentrality parameter
- C: significance threshold

- ndist: Standard normal distribution adapted from ID Hill, “The Normal Integral” Applied Statistics, Vol 22, pp. 424-427 available [here](#).
- ninv: Inverse normal distribution adapted from Wichura’s PPND16, Algorithm AS241, Applied Statistics Vol 37 1988 pp 477 - 484 available [here](#).

For definitions of the other variables click [here](#).