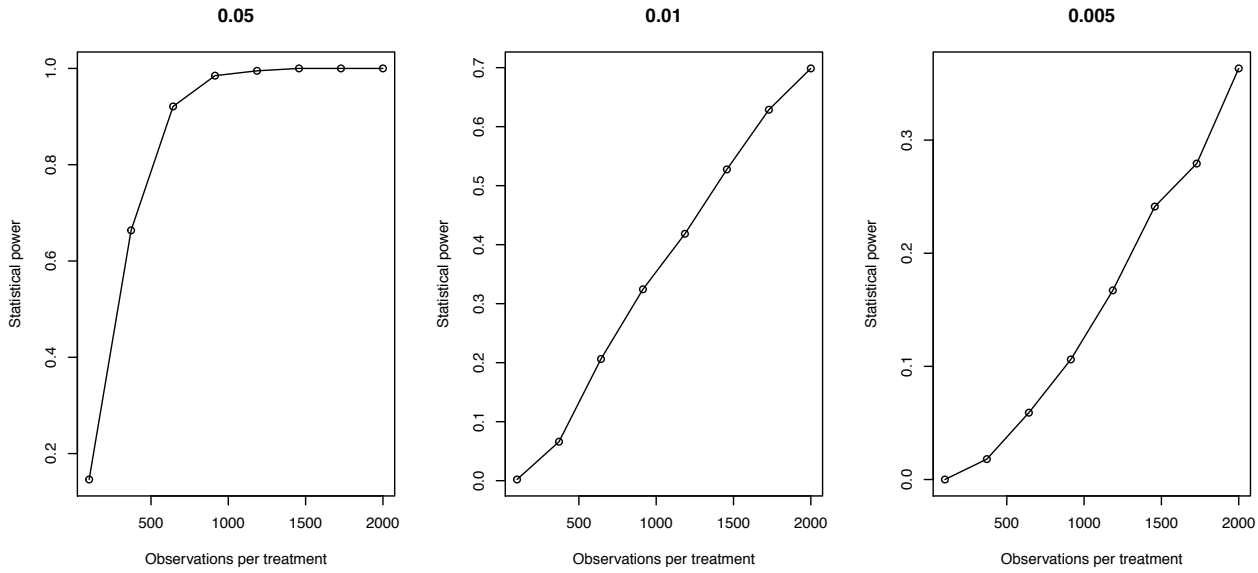
Power calculations

```r
# Simulate the data from a Binomial(n, p) where p_treated is 2 * p control
simulate <- function(n, p) {
  p_treated <- 2 * p
  a <- rbinom(n, 1, p)
  b <- rbinom(n, 1, p_treated)
  d <- data.frame(y=c(a, b), z=c(rep(0, n), rep(1, n)))
  return(d)
}
test <- function(d) {
  d$y <- factor(d$y, levels=c(0, 1)) # This ensures that even with all 0s I get 2x2 table
  tab <- table(d) + 1 # This improves stability (Agresti, 1996)
  fisher.test(tab)$p.value
}


# Consider power at `l` sample sizes
n_seq <- seq(100, 2000, length=8)
p_seq <- c(0.05, 0.01, 0.005)
power <- matrix(nrow=length(n_seq), ncol=length(p_seq))
for (i in 1:length(n_seq)) {
  n <- n_seq[i]
  for (k in 1:length(p_seq)) {
    p <- p_seq[k]
    out <- replicate(999, test(simulate(n, p)) < 0.05)
    power[i, k] <- mean(out)
  }
}

# Plot results
par(mfrow=c(1, length(p_seq)))
for (k in 1:length(p_seq)) {
  plot(n_seq, power[, k], main=p_seq[k]
       , xlab="Observations per treatment"
       , ylab="Statistical power", type='o')
}
```


0.05
0.01
0.005
Statistical power
Observations per treatment
0.2
0.4
0.6
0.8
1.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
500
1000
1500
2000