

## LOSS-of-FUNCTION GENES

The 1000 genomes project has revealed 252 loss-of-function (LoF) genes occasionally found in homozygous state. Subsequent studies listed up to 2641 of these genes! These genes are apparently dispensable, very likely because of redundancy. This [PNAS paper](#) analyzes 190 of these genes with a relatively high frequency in at least one of the 5 studied populations. Many of these genes, quite expectedly, are olfactory receptor genes that may be undergoing pseudogenization. But, surprisingly, the paper notes that there may be positive selection for the loss of function of some genes and that this could be advantageous for human survival via an increased resistance to infectious diseases. Authors of a recent paper from a [Chinese lab](#) have shown that what nature does slowly can be done a lot more quickly in the laboratory by using gene editing technology. By knocking out both copies of two genes involved in viral infections, they have produced pigs that are now immune to some viral diseases.

Note: In mouse 'knockout experiments', the function of both copies of a gene is disrupted; study of the effect of the absence of the gene can give an insight into its function. In humans, function of genes can be similarly studied in individuals who are homozygous for a LoF mutation. Such mutations are more likely to be found in offspring of consanguineous marriages. Not surprisingly, a large number of the LoF genes listed by the study reported above, have been discovered in populations with a high rate of consanguinity. The authors of a [Nature paper](#) entitled "Human knockouts and phenotypic analysis in a cohort with a high rate of consanguinity", have performed their study in Pakistan, where ~60% of the marriages are between first cousins.