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"Glyceraldehyde-3-phosphate dehydrogenase 1 (GAP1) from methicillin-resistant. from the Institute of Enzymology and Biological Macromolecules. doi:10.1093/pmic/kvs041. Dean's Distinguished Lectures, from the Institute of Enzymology and Biological Macromolecules. Does the common factor in these pathways protect you from cardiovascular disease? PMID:18898507. This represents an extremely common problem. But although it is easily a serviceable substitute for yeast, it is a very poor genetic model. The problem is that in yeast, about 50% of the genes encode proteins essential for life. In other words, there is no synthetic, nonessential strain in which to perform genetic experiments. This is not the case with the bakers yeast. In the baker's yeast, about 20% of the genes are essential, which means that any synthetic, nonessential strain is viable. This provides a unique opportunity to study essential genes. Essential genes must be present in all cells in order to maintain the survival of the organism. These genes are inessential in a synthetic nonessential strain. In a synthetic nonessential strain, the phenotype of the gene can be restored by the introduction of an auxotrophic mutation or a temperature-sensitive mutation. This makes it possible to study genes that are essential by identifying the genes and studying the phenotype of the gene. This is the basic technique for studying essential genes. In synthetic nonessential strains, auxotrophic mutations are usually selected that can be complemented by the addition of a single nutrient source in the media. Introduction of the mutation at a nonpermissive temperature usually results in synthetic lethality, which is often termed the synthetic sickness effect. An example of a synthetic sickness effect is the inability of an essential gene to grow at 37 degrees C with an aspartate auxotroph. The introduction of the temperature-sensitive mutation often results in a synthetic sickness effect. The most common method for studying essential genes is to perform a synthetic genetic array (SGA). A SGA takes advantage of the fact that the single-stranded DNA (ssDNA) virus, which lacks a host cell, called a filamentous (F) phage, is incapable of infecting cells when the temperature is above 42 degrees C. Thus, as in the case of the temperature-sensitive mutant, it is possible to select for an F phage that is able to infect only mutant cells. 82157476af