Proline is a member of the glutamine family of amino acids, whose biosynthesis depends on the carbon skeleton of glutamic acid. Proline biosynthesis, shown here, occurs in the cytosol and begins with activation of glutamate, by the Pro1p gamma-glutamyl kinase, to form glutamate-5-phosphate. This unstable intermediate is subsequently converted to glutamate semialdehyde by the gamma-glutamyl phosphate reductasePro2p. Glutamate semialdehyde spontaneously cyclizes to form delta 1-pyrroline-5-carboxylate, which is then converted to proline by Pro3p, a P5C reductase. In S. cerevisiae, the P5C reductase enzyme also catalyzes the fourth step in arginine degradation. Since these two pathways converge at this step, the requirement for proline in pro1 and pro2 mutant cells can be satisfied by arginine. In contrast, pro3 mutants require the addition of proline for growth. A unique property of all the pro mutant strains is that they cannot grow on standard YPD rich media..In addition to proline auxotrophy, Pro3p deficiency results in a temperature-sensitive phenotype in which cells arrest in the G1 phase of the cell cycle. The PRO3 gene appears to be constitutively expressed and under no form of transcriptional regulation.