The INO1 gene encodes inositol-3-phosphate synthase, the enzyme that catalyzes the conversion of glucose 6-phosphate to inositol 3-phosphate. During the logarithmic phase of growth, in the absence of inositol from the growth medium, this reaction is rate limiting for the synthesis of inositol-containing phospholipids. Inositol phosphates have been shown to play central roles in signal transduction pathways for a variety of neurotransmitters, hormones and growth factors and in mRNA export from nucleus. Expression of the INO1 gene requires binding of Ino2p and Ino4p transcriptional activators to a repeated element, UASINO. This element is found in the promoters of INO1 and other co-regulated genesof the phospholipid biosynthesis pathway that are subject to regulation by inositol. The INO2 and INO4 genes encode basic helix-loop-helix proteins that bind to the UASINO elementas a heterodimer. When inositol is present, transcription of the INO1 gene is repressed by the negative regulatory protein Opi1p. Opi1p does not bind to UASINO directly nor does it interact with Ino2p and Ino4p activators. The exact mechanism of repression by Opi1p is unknown, although phosphorylation of Opi1p at Ser26 functions to inactivate Opi1p and mediates attenuation of the negative regulatory function of Opi1p on the expression of the INO1 gene. It has been shown that transient nitrogen limitation can also cause INO1 repression. INO1 transcription is a sensitive indicator of defects in the cellular transcription apparatus. Mutations in the large subunit of RNA polymerase II, the TATA binding protein, or components of the SWI/SNF chromatin remodeling complex lead to inositol auxotrophydue to an inability to activate the INO1 gene. It is not yet known which proteins transmit the inositol signal to these transcriptional regulatory factors, due in part to the complexity of overlapping pathways that impinge on INO1 expression.