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RESEARCH PAPERS

Evidence that SNF2/SWI2 and SNF5 activate transcription in yeast by altering chromatin structure

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Changes in chromatin structure have frequently been correlated with changes in transcription. However, the cause-and-effect relationship between chromatin structure and transcription has been hard to determine. In addition, identifying the proteins that regulate chromatin structure has been difficult. Recent evidence suggests that a functionally related set of yeast transcriptional activators (SNF2/SWI2, SNF5, SNF6, SWI1, and SWI3), required for transcription of a diverse set of genes, may affect chromatin structure. We now present genetic and molecular evidence that at least two of these transcriptional activators, SNF2/SWI2 and SNF5, function by antagonizing repression mediated by nucleosomes. First, the transcriptional defects in strains lacking these SNF genes are suppressed by a deletion of one of the two sets of genes encoding histones H2A and H2B, (hta1-htb1) delta. Second, at one affected promoter (SUC2), chromatin structure is altered in snf2/swi2 and snf5 mutants, and this chromatin defect is suppressed by (hta1-htb1) delta. Finally, analysis of chromatin structure at a mutant SUC2 promoter, in which the TATA box has been destroyed, demonstrates that the differences in SUC2 chromatin structure between SNF5+ and snf5 mutant strains are not simply an effect of different levels of SUC2 transcription. Thus, these results strongly suggest that SNF2/SWI2 and SNF5 cause changes in chromatin structure and that these changes allow transcriptional activation.