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The repressor-activator protein 1 (Rap1) binds to [C(1-3)A]n repeats, acts as a transcriptional activator, and represses gene expression at telomeres by binding to the accessory silencing proteins Sir2, Sir3 and Sir4. In the Advance Online Publication of Nature Genetics, Lieb and colleagues, at Stanford University, describe a study to investigate the genome-wide DNA-binding specificity of Rap1 and Sir proteins *in vivo* (*Nature Genetics* 2001 DOI:10.1038/ng569). They performed chromatin immunoprecipitation (IP) experiments, followed by whole genome microarray analysis to map protein-DNA interactions (for Rap1, Sir2, Sir3 and Sir4) at a resolution of 2 kb. Rap1 binding localized to 294 loci (representing 5.4% of all yeast genes). Half of the Rap1-binding sites mapped to telomeric regions. Lieb *et al.* identified 362 ORFs that are adjacent to intergenic Rap1-binding loci. These included known Rap1 targets such as ribosomal protein genes and genes encoding glycolysis enzymes. They identified 185 ORFs next to new Rap1-binding sites. Many of these are involved in ribosomal RNA metabolism and the cell's capacity for protein synthesis. Rap1 targets are amongst the most heavily transcribed genes, representing 37% of mRNA transcripts in growing cells. Rap1 binding showed a preference for intergenic sequences and a strong bias for promoter regions. The authors suggest that a molecular mechanism exists that distinguishes between intergenic or coding sequence Rap1-binding sites.

References

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