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The research in the lab concerns three topics as follows:

First, we are interested in the mechanisms of meiotic recombination in the yeast *Saccharomyces cerevisiae*. Our analysis has been concentrated on a hotspot for exchange located near the *HIS4* gene. Hotspot activity requires the binding of several transcription factors, but is not directly related to the level of transcription. This binding is required for efficient generation of a double-strand break at *HIS4*.

Our second area of research is the stability of simple repetitive DNA sequences in yeast and in higher organisms. Simple repetitive tracts, such as poly GT, are frequent in all organisms, and alterations in the lengths of these tracts are associated with some human diseases (such as Huntington's disease). In our analysis of the genetic control of tract stability in yeast, we find that stability is not affected by mutations that alter the rate of recombination, but is greatly decreased by mutations that reduce DNA mismatch repair. One interpretation of these results is that changes in tract length reflect mistakes made during DNA replication. In collaboration with others, we are attempting to develop methods of quantitating tract instability in higher organisms.

The third area of research is the replication of chromosome ends (telomeres). We recently found the *TEL1*, a yeast gene required for normal telomere replication, is homologous to the human gene that is defective in patients with the genetic disease ataxia telangiectasia.

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Mapping regions of high (red) and low (green) meiotic recombination on yeast chromosome III by DNA microarrays (J. Gerton, J. DeRisi, P. Brown and T. Petes). Each rectangle represents a gene.