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Isolation and Characterization of HRD3 Gene Involved in DNA Repair and Cell Viability

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The *RAD3* gene of *Saccharomyces cerevisiae* is required for excision repair and is essential for cell viability. RAD3 encoded protein possesses a single stranded DNA-dependent ATPase and DNA and DNA-RNA helicase activities. To examine the extent of conservation of structure and function of *RAD3* during eukaryotic evolution, the *RAD3* homolog gene was isolated by screening of genomic DNA library. The isolated gene was designated as *HRD3* (Homologue of *RAD3* gene). Southern blot analysis confirmed that *S. pombe* chromosome contains the same DNA as *HRD3* gene and this gene exists as a single copy in *S. pombe*. The transcript of 2.8 kb was detected by northern blot analysis. The level of transcripts increased by ultraviolet (UV) irradiation, indicating that *HRD3* is one of the UV-inducible genes in *S. pombe*. Furthermore, the predicted partial sequence of HRD3 protein has 60% identity to *S. cerevisiae* *RAD3* gene. This homology is particularly striking in the regions identified as being conserved in a group of DNA helicases. Gene deletion experiments indicate that the *HRD3* gene is essential for viability and DNA repair function. These observations suggest a evolutionary conservation of other protein components with which HRD3 interacts in mediating its DNA repair and viability functions.