

Studies on the Molecular mechanism of plant Metabolic Regulation and Protein Engineering of Biomedicine

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We obtained the wild-type gene and performed a serial mutants of Trichosanthin (*TC S*), an anti-virus and anti-tumor protein extracted from *Trichosanthes kirilowii*, a Chinese medicinal herb. We found some amino acid residues which were closely related to immunoreactions or/and involved in the capability of TCS to recognition and enter the cells. We also found that TCS induces apoptosis of choriocarcinoma and leukaemia cells by stimulating production of reactive oxygen species (ROS). These results provided the valuable information to eliminate or ameliorate the immunogenicity and toxicity of TCS, and it will be contribute to construct the guide-protein which are special damage to carcinoma such as hepatoma and breast cancer.

We cloned gibberellin 20-oxidase gene *rga5* and its isozyme gene *sd1* from a rice cultivar 'aizizhan', and other eleven dwarfing cultivars. We characterized the gene's regulative function on the anabolism of gibberellin and the development of rice. At the same time, we developed the T-linker PCR technique for chromosome walking or for isolation of tagged DNA sequence.

In addition, We isolated a rice defense gene *rPAL-P5* (*phenylalanine ammonia-lyase, PAL*), including the 5'-upstream and exon I coding regions of *PAL*. The expression of several *PALs*, including *rPAL-P5*, was strongly induced following inoculation with *Pyricularia oryzae* or treatment with a *P. oryzae* elicitor. To identify the promoter activity induced by the *P. oryzae* elicitor, we constructed and subsequently transformed *rPAL-P5* promoter deletion series into rice calli using particle bombardment. Results from both elicitor-inducible reporter gene and gel mobility shift assays demonstrated that the sequence -349 to -256 of the *rPAL-P5* promoter includes a *cis*-element involved in the induction of *P. oryzae*. We are presently trying to isolate and identify the regulatory factor of *rPAL-P5* that is activated following pathogen infection in rice plant.

Recent Publications

1. Yan YX, An CC, Li L, Gu JY, Tan GH and Chen ZL (2003): T-linker Specific Ligation PCR (T-linker-PCR): An advanced PCR technique for chromosome walking or for isolation of tagged DNA ends. *Nucleic Acids Res.*, Vol. 31, No.12:1-7.
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3. Wang Lijiang, An Chengcai, Wanqiang Qian et al: Analysis of the putative *cis*-region involved in induction by *Pyricularia oryzae* elicitor in the promoter of a gene encoding phenylalanine ammonia-lyase in rice. *Plant Cell Report* (In Press, 2003).
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7. Chengcai An, Yuki Ichinose, Tetsuji Yamada, Hachiro Oku et al(1993): Organization of the genes encoding chalcone synthase in *Pisum sativum*. *Plant Molecular Biology*, 21:789-803.