Expression profiles of the apoptosis signaling pathway mediated by death receptor and endoplasmic reticulum in rat liver regeneration

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ABSTRACT. The death receptor and endoplasmic reticulum (ER) are closely related to cell apoptosis, and it is worth studying whether the apoptosis pathways mediated by them are involved in liver regeneration. To understand the mechanism underlying death receptor- and ER-mediated apoptosis during rat liver regeneration, we used the Rat Genome 230 2.0 Array to determine the changes in gene expression. We then searched the gene ontology (GO) and NCBI databases for genes associated with cell apoptosis mediated by the death receptor and ER. QIAGEN and KEGG databases were used for the related signaling pathways. We used the expression profile function to calculate the activity levels of the known apoptosis signaling pathways. The results of our study showed that the initial gene expression numbers in initiation, G0/G1 transition, cell proliferation, and redifferentiation and structural reconstruction phases were 32, 25, 44, and 29, respectively. This demonstrates that liver regeneration-related genes primarily start

their expression in the initiation phase and work differently in each phase. By calculation and analysis using the gene synergy formula, it was suggested that the apoptosis signaling pathways [FAS, death receptor 3 (DR3), tumor necrosis factor receptor 1 (TNFR1), and ER] induced cell apoptosis in whole liver regeneration and anti-apoptosis pathways (DR3 and TNFR2) restrained apoptosis in the early phase of liver regeneration. In summary, these apoptosis pathways coordinated and regulated quality and quantity of the regenerating liver cells.

Key words: Partial hepatectomy; Liver regeneration; Death receptor; Endoplasmic reticulum; Cell apoptosis

