



Key genes associated with diabetes mellitus and hepatocellular carcinoma

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ABSTRACT

Accumulating evidence indicates a strong correlation between type 2 diabetes mellitus (T2DM) and hepatocellular carcinoma (HCC), but the underlying pathophysiology is still elusive. We aimed to identify unrecognized but important genes and pathways related to T2DM and HCC by bioinformatic analysis. The GSE64998 and GSE15653 datasets (for T2DM), the GSE121248 dataset and the Cancer Genome Atlas-Liver Hepatocellular Carcinoma (TCGA-LIHC) dataset (for HCC) were downloaded. Differential expression analysis, functional and pathway enrichment analysis, protein-protein interaction (PPI) network construction, survival analysis, transcription factor (TF) prediction, and correlation of gene expression with methylation and tumour-infiltrating immune cells were conducted. Nine genes, namely, *CDNF*, *CRELD2*, *DNAJB11*, *DTL*, *GIN52*, *MANF*, *PDIA4*, *PDIA6*, and *VCP*, were recognized as hub genes. Enrichment analysis revealed several enriched terms and pathways. Transcription factors such as Kruppel-like factor 6, abnormal methylation and immune dysregulation might help explain the dysregulation of hub genes. Our study identified nine hub genes that might play a critical role in both T2DM and HCC. However, more studies are warranted to clarify the mechanisms of these genes.

1. Introduction

Hepatocellular carcinoma (HCC) remains a great challenge in public health worldwide [23]. Despite advances in HCC management, the treatment efficacy and overall prognosis are far from satisfying. There is always an urgent need to better understand the underlying molecular mechanisms in HCC.

Diabetes mellitus (DM) is another continuously increasing burden on public health around the world [9]. Accumulating evidence indicates a strong correlation between diabetes mellitus (DM) and numerous cancers such as colon cancer, ovarian cancer, colorectal cancer, and HCC [47]. Type 2 DM (T2DM) is an independent risk factor for HCC development and mortality [41,43]. Furthermore, the use of anti-diabetic medications such as metformin has been reported to be associated with an improved HCC prognosis [31]. The underlying mechanisms have been linked to hyperglycaemia, hyperinsulinaemia, insulin resistance, activation of insulin-like growth factor (IGF) signalling pathways, and the pharmacological effect of anti-diabetic medications [42]. However, the details of the pathophysiological mechanisms are still elusive.

In this study, we aimed to demonstrate the underlying pathophysiological association between T2DM and HCC. Furthermore, we explored the functions, prognostic roles, and potential mechanisms of hub genes in HCC.

2. Materials and methods

2.1. Data collection

The GSE64998, GSE15653, and GSE121248 datasets were downloaded from the Gene Expression Omnibus (GEO, RRID: SCR_005012, <https://www.ncbi.nlm.nih.gov/geo/>) database. The GSE64998 dataset contained the gene expression profiles of seven obese T2DM patients and six obese non-diabetic controls [30]. The GSE15653 dataset contained the gene expression profiles of nine obese T2DM and four obese non-diabetic controls [40]. The GSE121248 dataset contained the gene expression profiles of 70 HCC and 37 normal controls [48]. In addition, level 3 mRNA expression profiles and clinical data from 374 HCC and 50 normal control samples were obtained from The Cancer Genome Atlas liver hepatocellular carcinoma dataset (TCGA-LIHC) (RRID: SCR_003193, <http://cancergenome.nih.gov/>) and the cBioPortal for Cancer Genomics (RRID: SCR_014555, <http://www.cbioportal.org/>) [6,15]. The data were downloaded from publicly available databases; hence, no additional ethical approval was needed.

2.2. Identification of differentially expressed genes (DEGs) in T2DM and HCC

To investigate DEGs in each GEO dataset, we used the limma R

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package (RRID: SCR_010943) [38]. Controlling the false discovery rate (FDR), we defined DEGs as genes with a corrected $p < 0.30$ for T2DM or $p < 0.05$ for HCC. The intersecting DEGs of T2DM and HCC were used for further analysis.

2.3. Retrieval of HCC driver genes

A variety of HCC driver genes have been reported in the literature and databases. We used the keyword search “HCC or hepatocellular carcinoma” to retrieve HCC driver genes from the Online Mendelian Inheritance (OMIM) database (RRID: SCR_006437, <https://omim.org/>) [37]. In addition, two recent comprehensive studies were reviewed to retrieve HCC driver genes [5,7].

2.4. Functional and pathway enrichment analysis

To explore the significantly enriched Gene Ontology (GO) terms and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways of DEGs and HCC driver genes, we used the ClusterProfiler R package (RRID: SCR_016884) [51]. The Benjamini-Hochberg (BH) procedure was selected to correct the p -value, and the cut-off p -value was < 0.05 .

2.5. Construction of a protein-protein interaction (PPI) network, module analysis, and hub gene identification

The PPI network was retrieved from the Search Tool for the Retrieval of Interacting Genes (STRING; RRID: SCR_005223, <http://www.string-db.org/>) [12] and visualized by the software Cytoscape 3.6.1 (RRID: SCR_003032, <http://www.cytoscape.org/>). The Molecular Complex Detection (MCODE) plugin (RRID: SCR_015828) in Cytoscape was used to identify the most significant module in the network based on the graph-theoretic clustering algorithm [4]. To identify the hub gene in the PPI network, we used the cytoHubba plugin (<http://hub.iis.sinica.edu.tw/cytohubba/>) [8] for Cytoscape. Two analysis methods, namely, density of maximum neighbourhood component (DMNC) and maximal clique centrality (MCC), were used. Then, a Venn diagram was used to find the intersecting hub genes.

2.6. Validation of the expression pattern of hub genes

The cBioPortal for Cancer Genomics was used to investigate the expression pattern of the hub genes according to the instructions [24]. The oncoplot of the hub genes was downloaded. The expression of the hub genes in 50 paired HCC and non-tumour tissues from the TCGA-LIHC dataset were analysed. Another independent dataset, GSE15653, was used to verify the expression of the hub genes in T2DM. The difference in expression was analysed using the Wilcoxon signed-rank test, and $p < 0.05$ was considered statistically significant. The protein expression of the hub genes was explored in the Human Protein Atlas (<http://www.proteinatlas.org>).

2.7. Survival analysis of the hub genes based on the TCGA-LIHC dataset

To investigate the prognostic role of the hub genes, we used GEPIA (<http://gepia.cancer-pku.cn/index.html>) [45]. Then, level 3 mRNA expression profiles from TCGA-LIHC were pre-processed by normalizing to transcripts per million and applying a \log_2 transformation. A total of 360 HCC samples with relevant clinical data were included for univariate and stepwise multivariate Cox proportional hazard regression analysis using SPSS 20.0. The median value was used as the cut-off value to define high versus low expression. In addition, the web tool SurvExpress (<http://bioinformatica.mty.itesm.mx:8080/Biomatec/SurvivaX.jsp>) [1] was used to investigate the combined prognostic role of the hub genes. For all survival analyses, \log -rank $p < 0.05$ was considered statistically significant.

2.8. Identification of potential transcription factors

The TRANSFAC® database (RRID: SCR_005620) [36] comprises data on transcription factors (TF), their target genes and regulatory binding sites. The Gene Radar tool on the GCBI website (Genminix Informatics Ltd., Shanghai, China) (<https://www.gcbi.com.cn/gclib/html/index>) was used to predict candidate TFs of the hub genes. The Gene Radar tool retrieved comprehensive data from the TRANSFAC® database and further classified the retrieved TFs into high, medium, and low recommendation grades by integrating the data on single-nucleotide polymorphism (SNP) loci and methylation modification of TF binding sites. Only TFs with high-grade recommendation were retrieved.

2.9. Methylation status of the hub genes

Considering the importance of abnormal methylation in aberrant gene expression in cancer, we explored the methylation status of the hub genes in the cBioPortal for Cancer Genomics. In addition, the web tool MethSurv (<https://biit.cs.ut.ee/methsurv/>) [39] was used to explore the prognostic role of each methylation site of the hub genes.

2.10. Correlation of hub gene expression with tumour-infiltrating immune cells

Considering the importance of immune dysregulation in both T2DM and HCC, we explored the correlation between hub gene mRNA expression and tumour-infiltrating immune cells. The web tool TIMER (<https://cistrome.shinyapps.io/timer/>) [32] was used. Six tumour-infiltrating immune subsets, including B cells, CD8+ T cells, CD4+ T cells, macrophages, neutrophils, and dendritic cells, were analysed.

3. Results

3.1. Identification of DEGs and retrieval of HCC driver genes

In the GSE64998 dataset, 380 upregulated and 392 downregulated genes were identified in T2DM patients compared with normal controls. In the dataset GSE121248, 5615 upregulated and 5452 downregulated genes were identified in HCC patients compared with normal controls. A heatmap and volcano plot illustrating the gene expression profiles of both datasets are shown in Fig. A1. As shown in Fig. 1, there were 149 common upregulated genes (DEGs1) and 164 common downregulated genes (DEGs3) in T2DM and HCC. In addition, 89 genes were found to be upregulated in HCC but downregulated in T2DM (DEGs2), while 53 genes were found to be upregulated in T2DM but downregulated in HCC (DEGs4). Genes in the subsets DEGs1 and DEGs3 (listed as DEGs below) were used for further analysis. In addition, 270 HCC driver genes were retrieved. The genes are listed in Table A1.

3.2. Functional and pathway enrichment analysis

For DEGs, GO analysis showed that changes in biological processes (BP) included significant enrichment of several metabolic processes (amino acid, carboxylic acid, etc.). Changes in molecular function (MF) included significant enrichment of binding-related function (cofactor binding, coenzyme binding, vitamin binding, transaminase binding, and ribosome binding). Changes in cellular component (CC) included significant enrichment of genes related to the mitochondrial matrix (Fig. 2A). Changes in KEGG pathways were significantly enriched in several metabolic processes (alanine, aspartate, and glutamate; tryptophan; cysteine and methionine) and the biosynthesis of amino acids (Fig. 2C).

For driver genes, GO analysis showed that changes in BP included significant enrichment of in various types of cellular response (to steroid hormones and to tumour necrosis factor), regulation (DNA binding transcription factor activity, protein catabolic processes, and

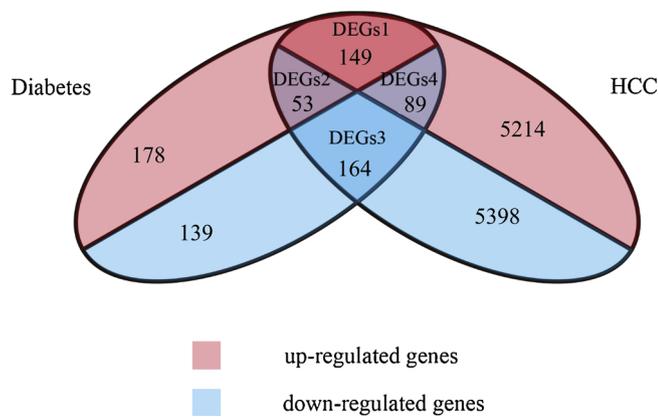


Fig. 1. Differentially expressed genes among DM DEGs and HCC DEGs. DEGs1 represents genes upregulated in both DM and CRC. DEGs2 represents genes upregulated in DM but downregulated in HCC. DEGs3 represents genes downregulated both in DM and HCC. DEGs4 represents genes downregulated in DM but upregulated in HCC. DEG, differentially expressed gene; DM, diabetes mellitus; HCC, hepatocellular carcinoma.

cyclin-dependent protein serine/threonine kinase activity), liver development, and cell cycle arrest. Changes in MF included significant enrichment of binding-related function (coactivator binding, chaperone binding, ubiquitin-like protein ligase binding, RNA polymerase II transcription factor binding, etc.) and kinase regulator activity.

Changes in CC included significant enrichment of genes related to the membrane, nuclear chromatin, protein kinase complex, late endosomes and the beta-catenin destruction complex (Fig. 2B). Changes in KEGG pathways were significantly enriched in various cancers (HCC, colorectal cancer, prostate cancer, and endometrial cancer), human virus infection (papillomavirus, T-cell leukaemia virus 1, hepatitis B and C), and cellular senescence (Fig. 2D).

3.3. Construction of PPI network, module analysis, and hub gene identification

A PPI network for DEGs was built, and the topological properties of the PPI network were analysed. As shown in Fig. 3A, the most significant module, which included ten upregulated genes and three downregulated genes, was extracted. Then, the top 20 genes calculated by two algorithms, MCC and DMMC, in the cytoHubba plug-in of Cytoscape were exported. Nine intersecting genes were considered hub genes for further analysis: cerebral dopamine neurotrophic factor (CDNF); cysteine-rich with EGF-like domains 2 (CRELD2); DnaJ (Hsp40) homologue, subfamily B, member 11 (DNAJB11); denticless E3 ubiquitin protein ligase homologue (DTL); GINS complex subunit 2 (GINS2); mesencephalic astrocyte-derived neurotrophic factor (MANF); protein disulfide isomerase family A, member 4 (PDIA4); protein disulfide isomerase family A, member 4 (PDIA6); and valosin-containing protein (VCP) (Fig. 3B). We then built another PPI network for the 270 driver genes and the nine hub genes (Fig. 4). All hub genes directly interacted with HCC driver genes.

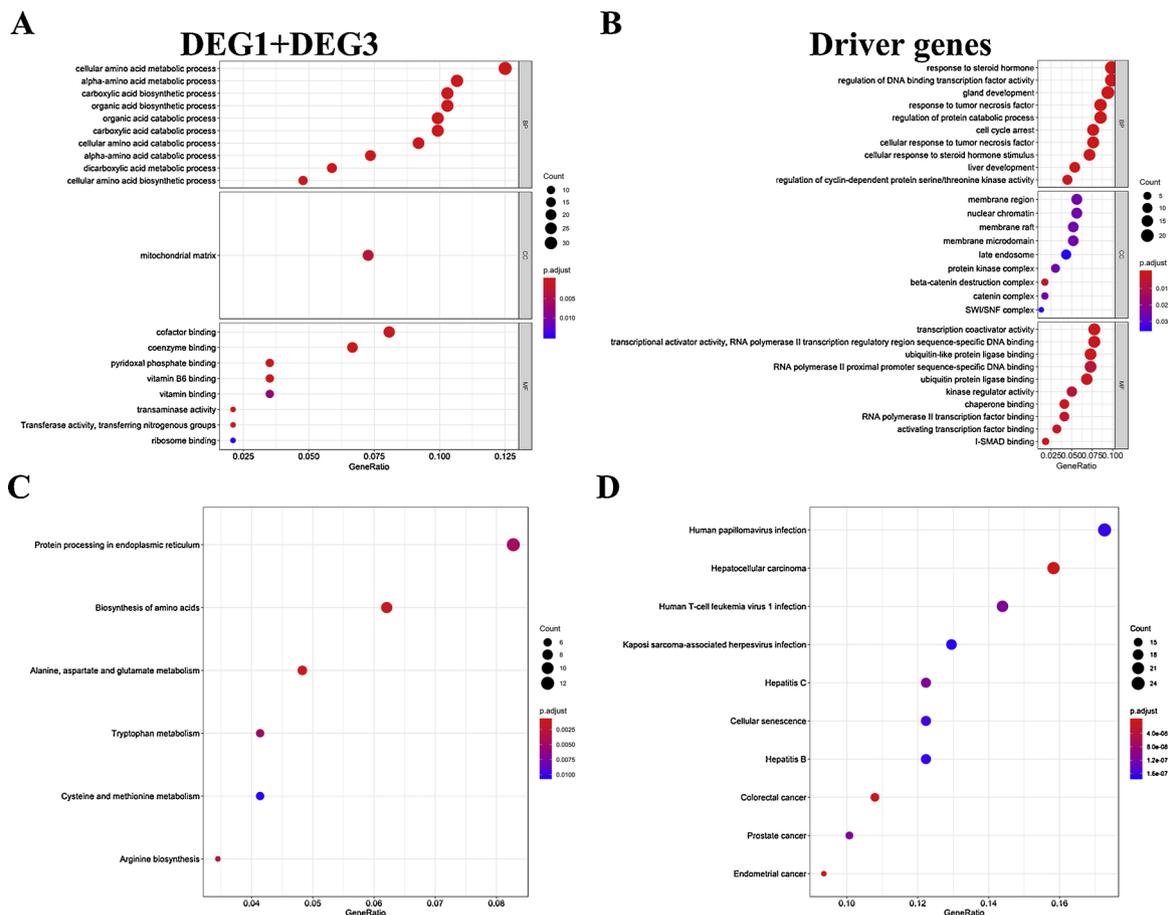


Fig. 2. Functional and pathway enrichment analysis of intersected differential genes and driver genes in HCC. (A) GO enrichment analysis of intersected differential genes. (B) GO enrichment analysis of driver genes. (C) KEGG pathway enrichment analysis of intersected differential genes. (D) KEGG pathway enrichment analysis of driver genes. DEG, differentially expressed gene; GO, Gene Ontology; KEGG, Kyoto Encyclopedia of Genes and Genomes; HCC, hepatocellular carcinoma.

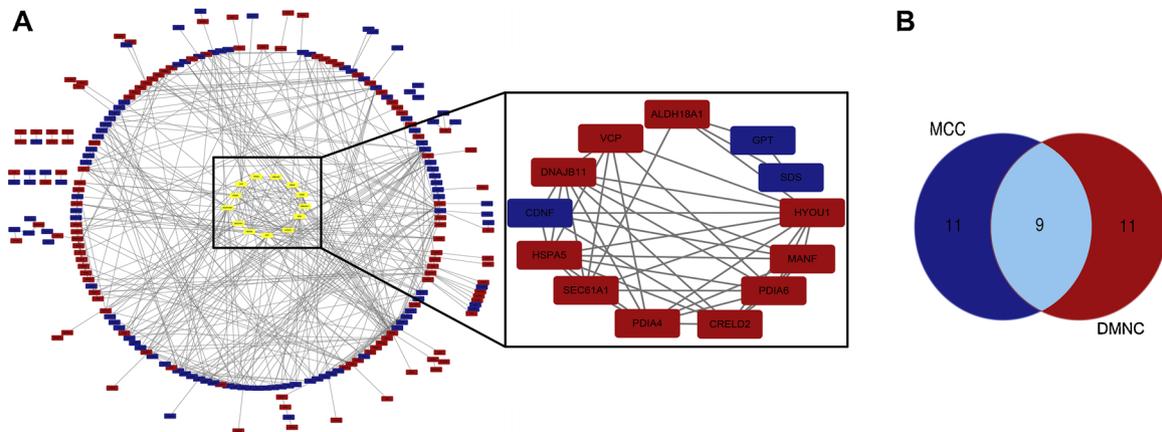


Fig. 3. PPI network construction, module analysis and hub gene identification of DEGs in HCC.

(A) Entire PPI network and the most significant module of DEGs. (B) Venn diagram of hub genes identified by two analytic methods, MCC and DMNC. DEGs, differentially expressed genes; DMNC, density of maximum neighbourhood component; HCC, hepatocellular carcinoma; MCC, maximal clique centrality; PPI, protein-protein interaction. Red represents upregulated genes, and blue represents downregulated genes.

3.4. Validation of the expression pattern of nine hub genes

Among the 366 patients included for analysis in the cBioPortal for Cancer Genomics database, 82 (22%) showed genetic alterations in the nine hub genes. Amplification mutations were the most common genetic alteration (Fig. 5A). Consistent with the results in GEO datasets, the mRNA expression of CDNF was significantly downregulated, while that of CRELD2, DNAJB11, DTL, GINS2, MANF, PDIA4, PDIA6, and VCP was significantly upregulated in TCGA HCC compared with non-tumour tissues (Fig. 5B). However, in contrast to GSE64998 (Fig. A2), only PDIA6 was verified to be upregulated in T2DM of the GSE15653 dataset among the nine hub genes (Fig. A3). We further explored the protein expression of the nine hub genes in the Human Protein Profiles (Fig. 5C). The protein expression of CDNF seemed to be higher in normal tissue than in HCC, while that of CRELD2, DNAJB11, GINS2, PDIA4, and VCP in HCC seemed to be higher than in normal tissue.

3.5. Survival analysis of the nine hub genes based on the TCGA-LIHC dataset

The GEPIA web tool showed that the mRNA expression of CRELD2, DTL, GINS2, MANF, and PDIA6 was significantly associated with overall survival (OS) (Fig. 6A-E), while that of DTL and GINS2 was significantly associated with disease-free survival (DFS) in HCC (Fig. 6F-G). After multivariate cox regression analyses, DTL was found to be an adverse prognostic biomarker for both OS and DFS; MANF and CRELD2 were found to be adverse prognostic biomarkers for OS and DFS, respectively (Table A2; Table A3). Furthermore, the SurvExpress web tool showed that the prognostic score based on the nine hub genes could stratify patients into high- and low-risk groups. Overall survival and recurrence-free survival were significantly better in the low-risk group than in the high-risk group (Fig. 6H-I).

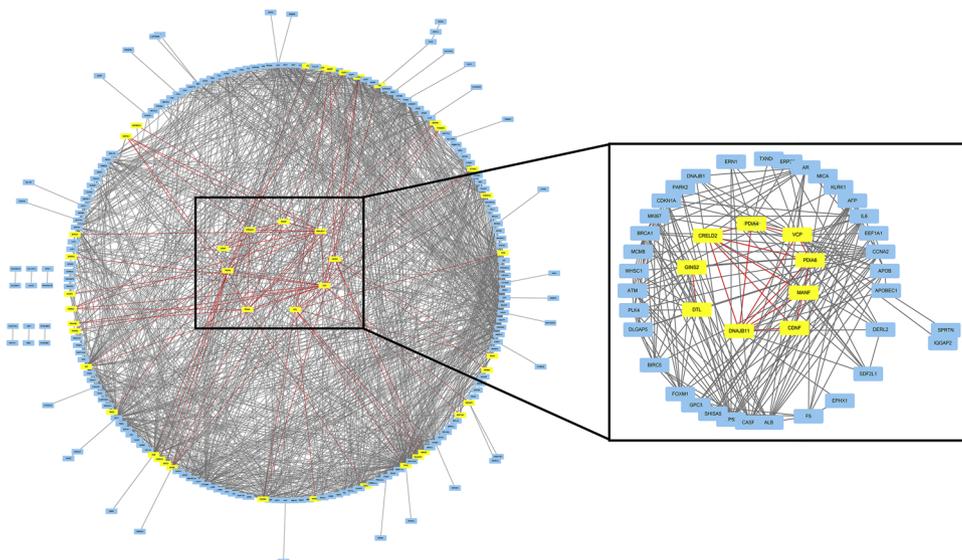


Fig. 4. PPI network including both the nine hub genes and the driver genes for HCC. The left panel shows the interaction network constructed from the 270 driver genes and nine hub genes. The hub genes are highlighted at the centre of the circle, and the red lines represent the direct interaction of the hub genes with the driver genes. The right panel shows the sub-network of the hub genes and their direct interaction with HCC driver genes. HCC, hepatocellular carcinoma; PPI, protein-protein interaction.

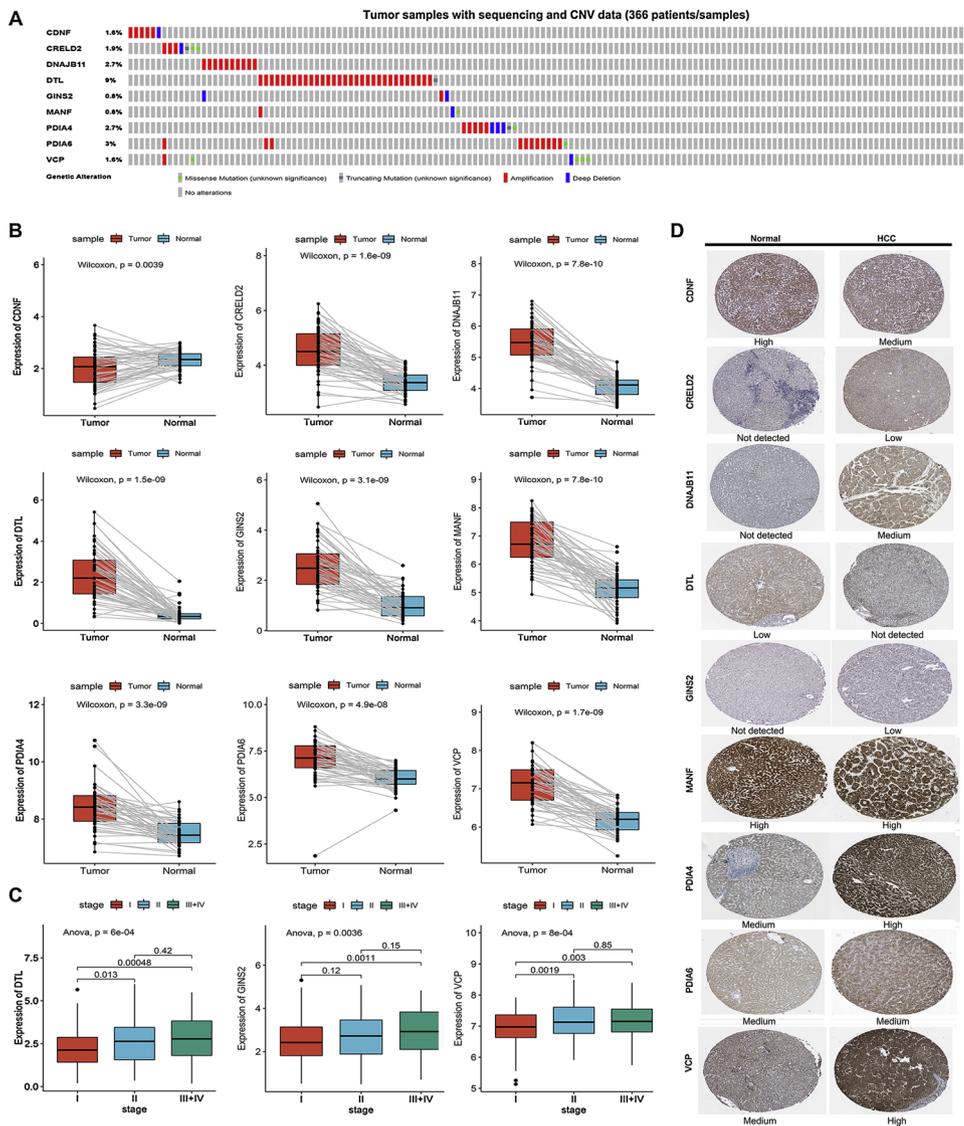


Fig. 5. Validation of the expression pattern of nine hub genes based on the TCGA database. (A) The oncoplot of the nine hub genes. (B) The expression of the nine hub genes in 50 paired HCC and normal controls in TCGA-LIHC. (C) Representative protein expression of the nine hub genes. The data are from the Human Protein Atlas (<http://www.proteinatlas.org>). CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAB11, DnaJ (Hsp40) homologue, sub-family B, member 11; DTL, denticleless E3 ubiquitin protein ligase homologue; GINS2, GINS complex subunit 2; HCC, hepatocellular carcinoma; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; TCGA-LIHC, The Cancer Genome Atlas-Liver Hepatocellular Carcinoma Dataset; VCP, valosin-containing protein.

3.6. Potential mechanisms of the nine hub genes

The potential TFs of the nine hub genes were retrieved (Table A4). CPBP (Kruppel-like factor 6, KLF6) was found to regulate all nine hub genes. In addition, E2F transcription factor (E2F), KLF2 (LKLf), paired related homeobox 2 (PRRX2), Spi-B transcription factor (SPIB), SRY (sex determining region Y)-box 10 (SOX10), SRY-box 18 (SOX18), Wilms tumour 1 (WT1), and zinc finger protein 354C (ZNF354C or KID3) were found to regulate 6 or above of the nine hub genes.

Correlation analysis showed that the mRNA expression of all nine hub genes was significantly negatively correlated with their methylation status (Fig. 7A-I). Furthermore, the MethSurv web tool showed that all hub genes except CDNF had one or more prognostic methylation sites (Fig. 7J-L) (Table A5). Taken together, abnormal methylation might play an important role in the aberrant expression of the nine hub genes.

The TIMER web tool showed that the expression of all nine hub genes except VCP was significantly correlated with one or more tumour-infiltrating immune subsets. For B-cells and CD8+ T-cells, the expression of DTL and GINS2 showed the most significant correlation with them. For CD4+ T-cells, macrophages, neutrophils and dendritic cells, the expression of CDNF and DTL showed the most significant correlation with them (Fig. 8).

4. Discussion

In this study, 149 common upregulated genes and 164 common downregulated genes were identified in T2DM and HCC when compared with normal controls. A total of 270 HCC driver genes were retrieved. Enrichment analysis revealed several gene ontology terms and KEGG pathways. Nine genes, including CDNF, CRELD2, DNAB11, DTL, GINS2, MANF, PDIA4, PDIA6, and VCP, were identified as hub genes.

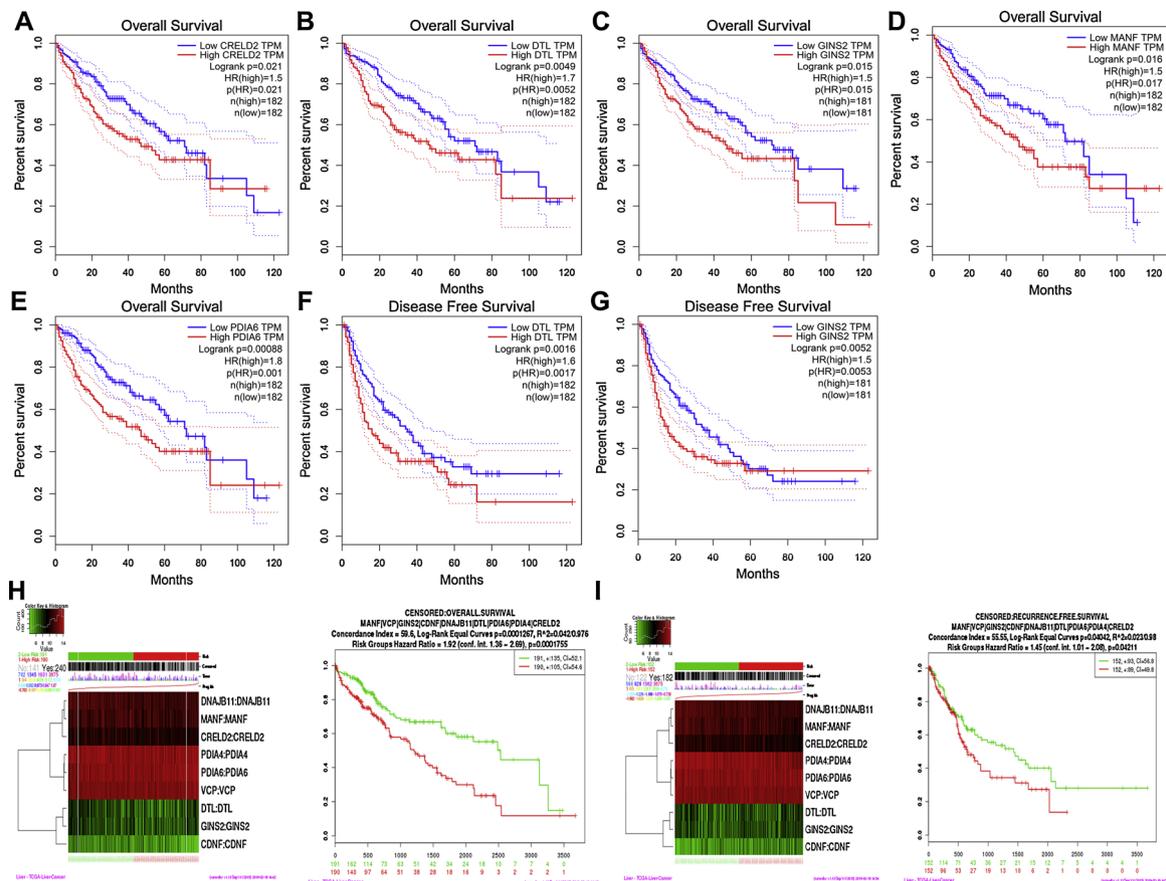


Fig. 6. Survival analysis of the nine hub genes in HCC.

(A)-(G) A Kaplan-Meier plot showing the significant prognostic roles of the hub genes. The data are from GEPIA (<http://gepia.cancer-pku.cn/index.html>). (H) (I) A heatmap showing the expression of the hub genes and a Kaplan-Meier plot showing the prognostic role of a risk score based on the hub genes. Data were from the SurvExpress TCGA liver cancer dataset (<http://bioinformatica.mty.itesm.mx:8080/Biomatec/SurvivaX.jsp>). CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homologue, subfamily B, member 11; DTL, denticleless E3 ubiquitin protein ligase homologue; GINS2, GINS complex subunit 2; HCC, hepatocellular carcinoma; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin-containing protein.

Some of the hub genes were found to be independent adverse prognostic biomarkers for OS and/or DFS, and a prognostic score based on the nine hub genes significantly stratified HCC patients' prognosis into high- and low-risk groups. Furthermore, potential mechanisms of the nine hub genes were explored from three aspects: TFs, methylation and their correlation with tumour-infiltrating immune cells.

Seven out of the nine hub genes, namely, CDNF, CRELD2, DNAJB11, MANF, PDIA4, PDIA6, and VCP, encode endoplasmic reticulum (ER)-related proteins. Disruption of ER function leads to abnormal accumulation of unfolded proteins and promotes apoptosis-induced cell death in a process known as "ER stress". The ER stress response is recognized as a key driver in sustaining malignant cells and promoting cancer progression. Three resident ER stress sensors, namely, activating transcription factor 6 (ATF6), inositol-requiring enzyme 1 (IRE) and double-stranded RNA-activated protein kinase (PKR)-like ER kinase (PERK), are responsible for the ER stress response [10]. Meanwhile, genes encoding ER-resident chaperone proteins, such as 78 kDa glucose-regulated protein (GRP78) [2] and ER HSP40/DNAJ 3 protein (ERdj3, DNAJB11) [29], counteract ER stress through protein

stabilization. MANF and CDNF (the paralogous protein of MANF) and MANF are a new class of evolutionarily conserved neurotrophic factors (NTFs), which promote neuronal growth, survival, and differentiation [50]. MANF and CDNF mainly localize in the ER and help maintain ER homeostasis [33]. MANF and CDNF are also involved in immune modulation [18,20] and cell regeneration [34]. While previous studies have paid much attention to the pathophysiological function of MANF and CDNF in neurodegenerative diseases, diabetes mellitus and ischaemia, little effort has been made to understand their roles in cancer, including HCC. CRELD2 has been characterized as a novel ER stress-inducible secretory glycoprotein in mice [26]. CRELD2 was positively regulated by ATF6 [26] but negatively regulated by GRP78 [28]. A recent study found that MANF significantly influenced protein transport and secretion of CRELD2, indicating the important role of crosstalk between MANF and CRELD2, especially in diseases related to ER stress [27]. The function and mechanisms of DNAJB11 have just begun to be revealed. DNAJB11 was identified as a critical player in autosomal-dominant polycystic kidney disease [13]. Co-chaperone ERdj3/DNAJB11 promoted HCC via suppressing the Z mutant of alpha-

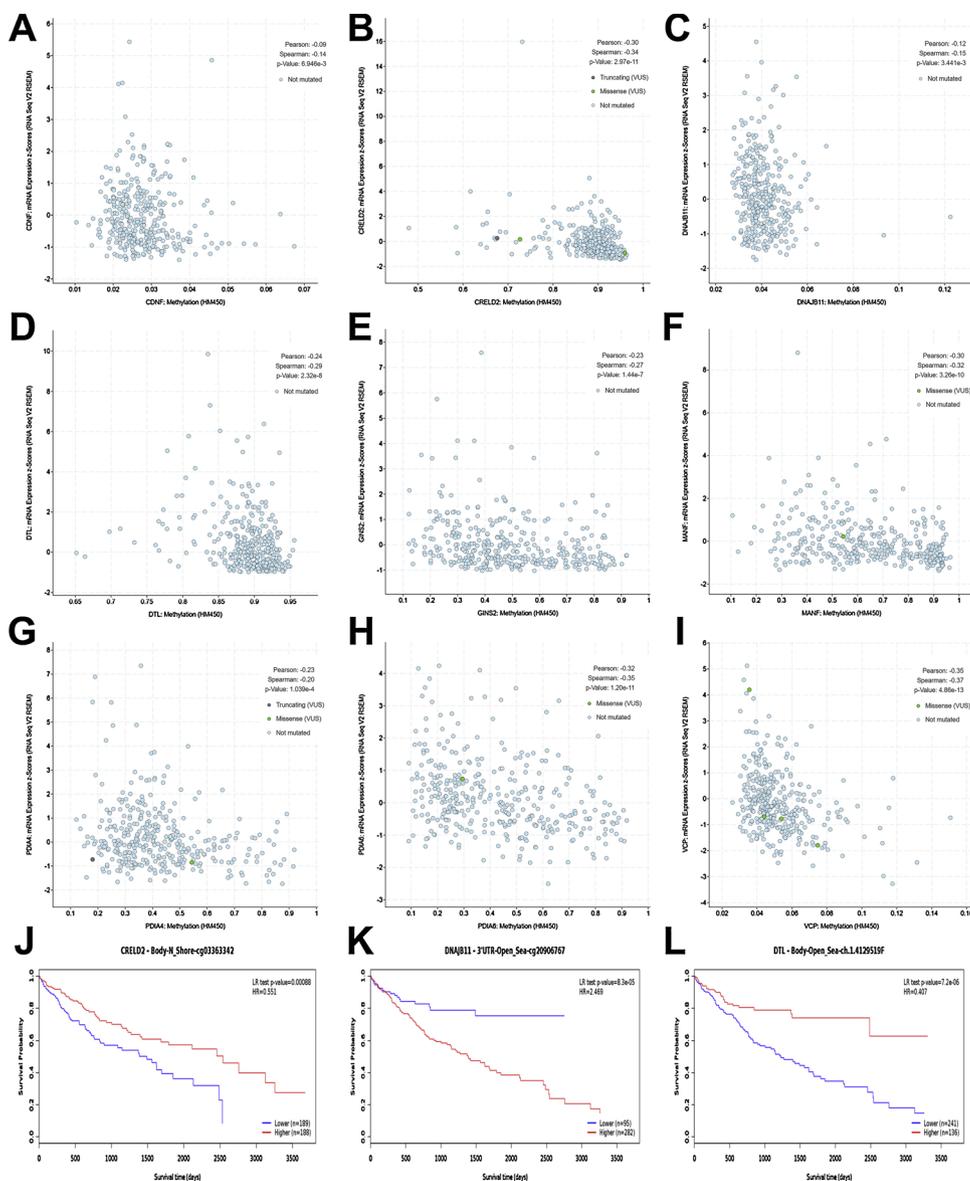


Fig. 7. The influence of methylation on mRNA expression and the prognostic role of representative methylation sites of hub genes in HCC.

(A-I) Correlation analysis showing the influence of methylation on mRNA expression in hub genes. The data are from cBioPortal for Cancer Genomics database (<http://www.cbioportal.org/>). (J-L) The representative Kaplan-Meier plot showing the prognostic role of the representative methylation site of the hub genes. Data were obtained from the MethSurv database (<https://biit.cs.ut.ee/methsurv/>). CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homologue, subfamily B, member 11; DTL, denticleless E3 ubiquitin protein ligase homologue; GINS2, GINS complex subunit 2; HCC, hepatocellular carcinoma; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin-containing protein.

1-antitrypsin (AATZ) [21]. PDIA4 and PDIA6 belong to the protein disulfide isomerase family. PDIA4 and PDIA6 were dramatically over-expressed in long-term cis-diaminedichloroplatinum (II)-resistant non-small lung cancer cells. Inactivation of PDIA4 and PDIA6, respectively restored the classical mitochondrial apoptosis pathway and a non-canonical cell death pathway sharing some features with necroptosis [14]. The oncogenic role of PDIA4 and PDIA6 has been demonstrated in an increasing number of cancers [17]. VCP belongs to the AAA (ATPase associated with diverse cellular activities) ATPase family. This ATPase participates in several cellular functions including protein degradation, DNA repair, regulation of the cell cycle, and activation of the NF-kappa B pathway [22]. Recent studies have linked VCP to various cancers, including HCC, and targeting VCP has been shown to be a promising novel approach to cancer treatment [16]. Overall, the concentration of

ER-associated hub genes indicated the central role of ER stress in the pathophysiological association between T2DM and HCC.

DTL and GINS2 are widely accepted oncogenes for various cancers [19,25]. Human DTL, a homologue of the *Drosophila* denticleless E3 ubiquitin-protein ligase, regulates cell cycle progression and genome stability [46]. GINS2, a member of the heterotetrameric GINS complex, is critical for the initiation of DNA replication [35]. The close association between these two genes (especially DTL) and tumour-infiltrating immune subsets might indicate their critical role in immune dysregulation in HCC. Notably, the TF KLF6 regulated all nine hub genes, which might indicate the central role of KLF6 in the pathophysiological association between T2DM and HCC. While KLF6 acts as a tumour suppressor, the alternative splicing of KLF6 into the antagonistic splice variant 1 (SV1) promotes tumorigenesis and cancer progression [11].

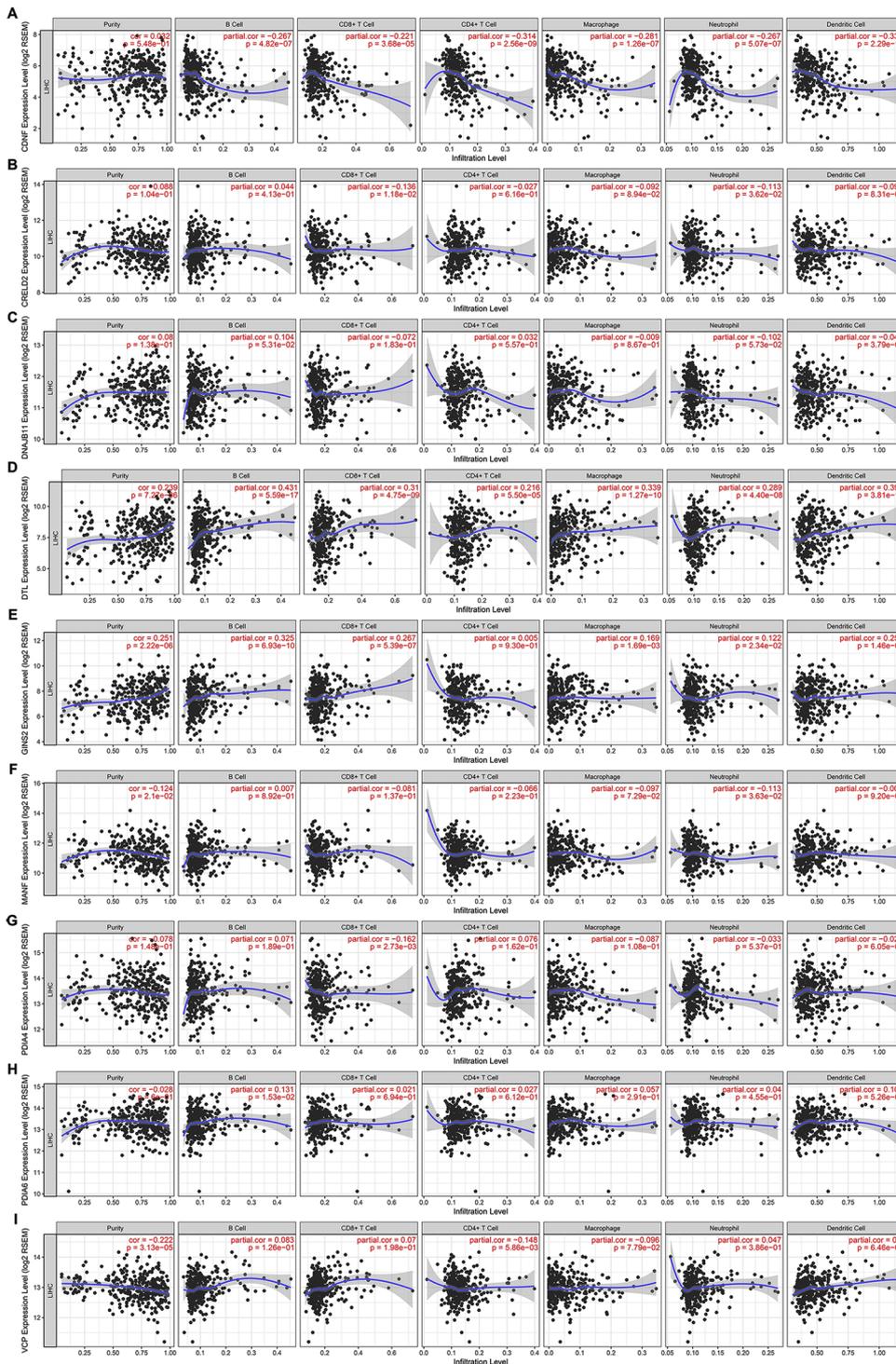


Fig. 8. Correlation analysis of hub gene mRNA expression with tumour-infiltrating immune cells.

(A)–(I) The correlation of CDNF, CRELD2, DNAJB11, DTL, GINS2, MANF, PDIA4, PDIA6, and VCP mRNA with tumour-infiltrating immune cells. The data are from the TIMER database (<https://cistrome.shinyapps.io/timer/>). CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homologue, sub-family B, member 11; DTL, denticleless E3 ubiquitin protein ligase homologue; GINS2, GINS complex subunit 2; HCC, hepatocellular carcinoma; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin-containing protein.

Furthermore, KLF6 has been reported to regulate renal fibrosis [44] and pulmonary fibrosis [49] in diabetes mellitus. Although further experimental data on the functions of individual genes are still needed, we have provided some promising directions for future studies.

A rapidly growing number of studies have attempted to identify

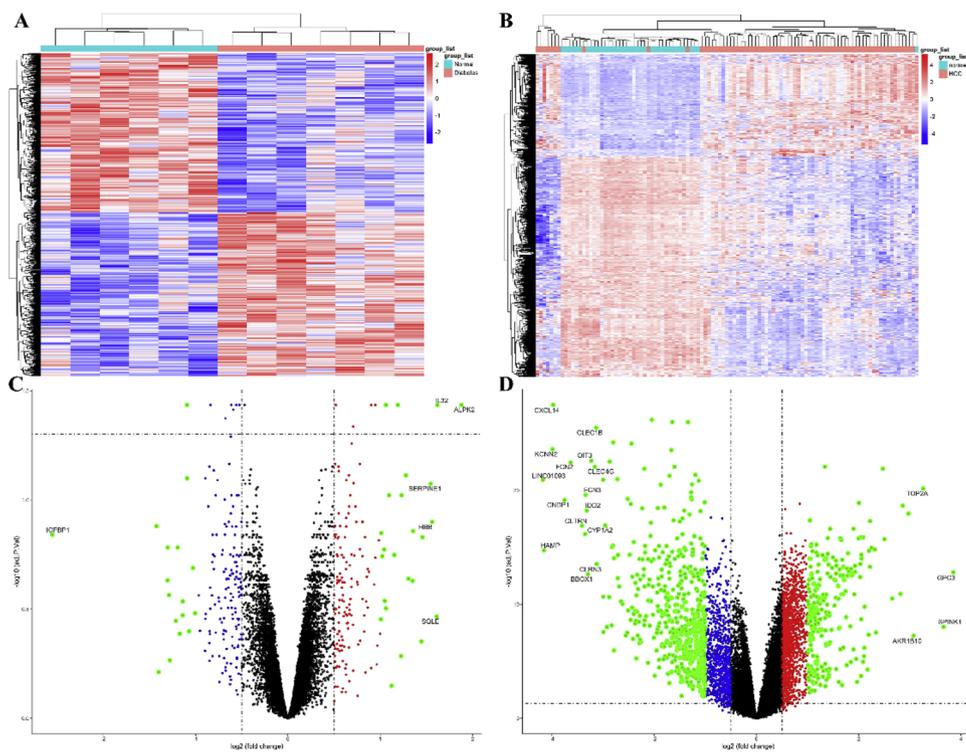
novel biomarkers by informatic analysis in HCC, but most of them have merely compared HCC patients and normal controls to find DEGs [3]. To our knowledge, our study is the first to clarify the pathophysiological association between T2DM and HCC by bioinformatic analysis and will provide some useful information for further understanding of

T2DM and HCC. However, several limitations of our study should be taken into consideration. First, only PDIA6 was verified to be significantly upregulated in an independent T2DM cohort. One possible explanation might be the limited number of T2DM patients included and the high p value cut-off used to identify differentially expressed genes, which could increase the false discovery rate. Another possible explanation might be due to the different baseline characteristics of T2DM patients in the two T2DM cohorts. Nevertheless, future studies with larger sample sizes are warranted. Second, most of the HCC patients included in our study were White or Asian. The results might be different for patients from other ethnic backgrounds. Third, the expression and prognostic roles of the nine hub genes at the protein level need further investigation. Fourth, the lack of functional experiments limits our mechanical analysis to being merely descriptive, and validation of the roles of the hub genes in vitro and in vivo is needed. Fifth, we failed to validate the expression changes of the hub genes during anti-diabetic medication treatment due to a lack of related datasets.

5. Conclusions

Our study identified nine hub genes that might play a critical role in

Appendix A



both T2DM and HCC. However, addition studies, especially functional experiments, are warranted to clarify the mechanisms of each gene. Our study may further the understanding of the development of DM towards HCC and provide useful information to support the search for novel HCC therapies.

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Declaration of Competing Interest

None.

Acknowledgement

None.

Fig. A1. A heatmap and volcano plot showing the expression changes in DM and HCC. (A)(C) A heatmap and volcano plot showing the expression change in DM when compared with normal controls. (B)(D) A heatmap and volcano plot showing the expression change in HCC. An absolute log₂ fold change (FC) > 0.5 and an adjusted P value of < 0.3 were used as cutoff values to define differentially expressed mRNAs in DM. An absolute log₂ FC > 1 and an adjusted P value of < 0.05 were used as cutoff values to define differentially expressed mRNAs in HCC. Red represents significantly upregulated mRNAs. Blue represents significantly downregulated mRNAs. Green represents genes with an absolute log₂ FC > 1.5 in DM or > 3 in HCC. The black represents non-differentially expressed mRNAs. DM, diabetes mellitus; HCC, hepatocellular carcinoma.

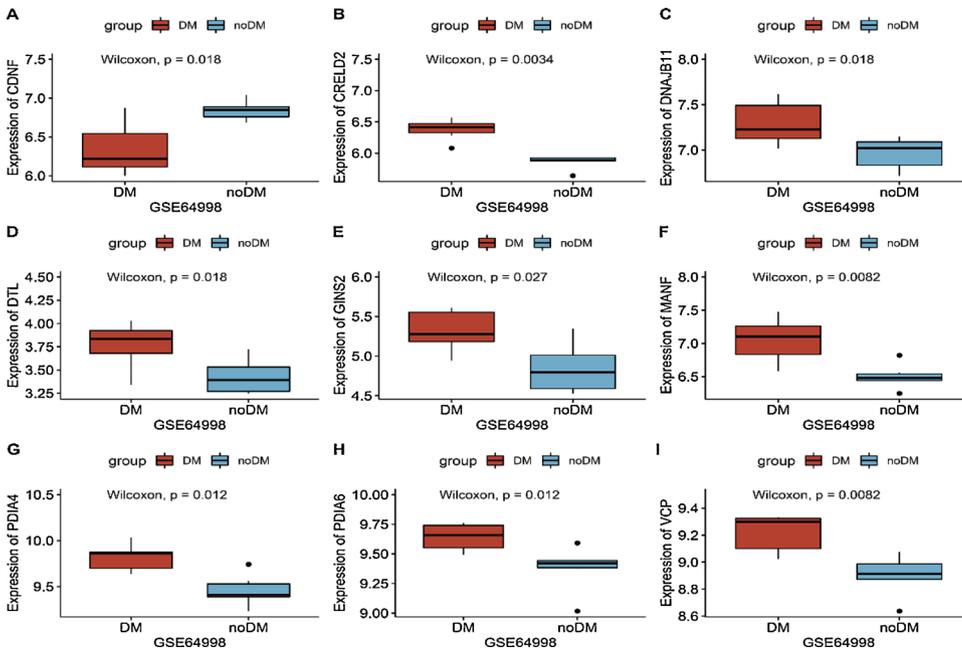


Fig. A2. The expression of the nine hub genes in the GSE64998 dataset.

The mRNA expression of CDNF (A), CRELD2 (B), DNAJB11 (C), DTL (D), GINS2 (E), MANF (F), PDIA4 (G), PDIA6 (H), and VCP (I) in T2DM when compared with patients without T2DM. CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homologue, subfamily B, member 11; DM, diabetes mellitus; DTL, denticleless E3 ubiquitin protein ligase homologue; GINS2, GINS complex subunit 2; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin-containing protein.

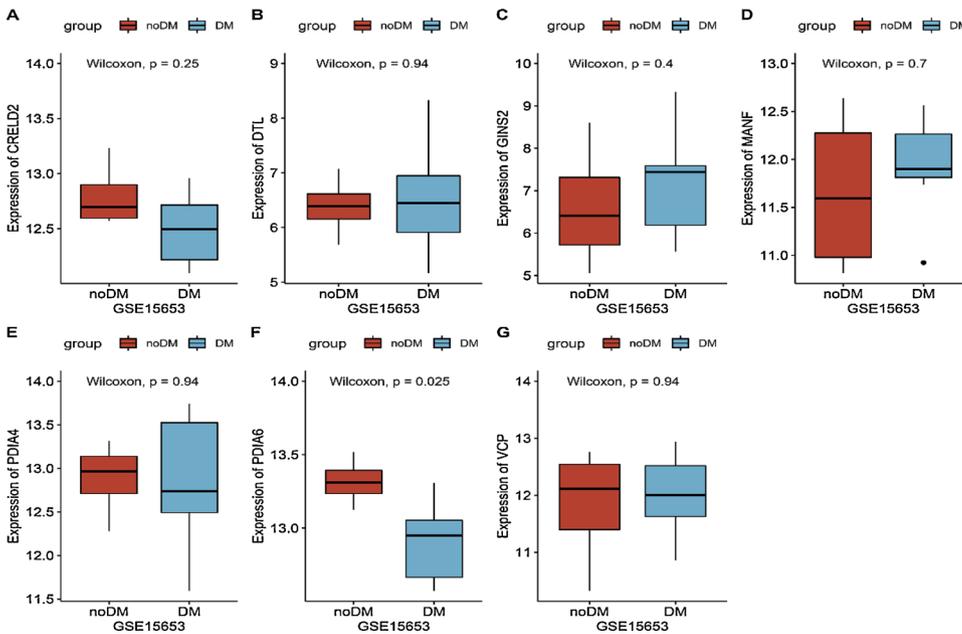


Fig. A3. The expression of the nine hub genes in the GSE15653 dataset.

The mRNA expression of CRELD2 (A), DTL (B), GINS2 (C), MANF (D), PDIA4 (E), PDIA6 (F), and VCP (G) in DM when compared with patients without DM. Data on CDNF and DNAJB11 were lacking in this dataset. CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homologue, subfamily B, member 11; DM, diabetes mellitus; DTL, denticleless E3 ubiquitin protein ligase homologue; GINS2, GINS complex subunit 2; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin-containing protein.

Table A1
Gene list of differentially expressed genes and HCC driver genes.

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
FAT4	AEN	NAP1L	MET	C9orf152	SUGCT	DIP2A	MSRB1
NUDT9P1	IGSF9	SRPK1	TEAD1	AACS	KRTAP10-4	TMEM19	CLMP
SLCO2B1	RCAN1	LMNB2	ADAM23	ELMO2	MAOA	FAM98A	RPS11
PYY	SULF2	PP1L1	RICTOR	PNMA1	MIR101-2	ISM1	PLPBP
BCHE	TMEM263	PLXNA1	ILF3-DT	KRTCAP2	CEP120	KLHL36	RIT2
CPEB3	PNPLA3	KIAA0100	DICER1-AS1	RPS17	IRS1	SYT12	SAMD4A
ASS1	BIVM	CRELD2	RHBG	SLMAP	DNAJB3	MMP15	FARP1
PPARGC1A	RAB6A	ABCF2	TMCO6	FAM219A	LZTFL1	EMC8	KCNMA1
CYP3A5	PVALB	DCUN1D5	RB1CC1	TMEM216	RBBP6	CAPN12	ABRA
PACSN3	BHLHE40	TDRKH	TBL1XR1	DPY30	FAM9B	ACOT2	C10orf90
HMBOX1	MPIG6B	CEP131	APOLD1	TUBD1	METTL21EP	CD151	PKNOX2
USP51	INHBE	MANF	MBTD1	NCBP2-AS2	LINC00575	ENTPD7	ERCC5
ALDH5A1	HBB	TFE3	ZNF585A	ATF6B	CCT6B	SLC2A10	FAM153A
GADD45B	NADK	ACLY	NUDT13	NDUFS6	ZBTB7C	HIST1H3E	CCDC116
GRAMD1C	CDKN1A	VCP	TET1	ERAL1	SNRNP48	FAM129B	BTG2
LMO7	CCDC71L	LAMA3	EIF3E	NAGPA	MT1P3	GPX2	RFXP3
FOXP2	ALAS2	PPP4R1	KTN1	SLC25A3	NXP2	TRHDE	BBOX1
TRAF6	UGT3A1	SEC61A1	STAG2	IRAK1	MAG11	SLC37A1	C10orf25
C9orf72	MYO1C	TP53I3	PIBF1	RPS18	DPP6	OTUB2	MEFV
MYO9A	HMCN1	DNAJB11	CCNB3	BRIX1	SNORD61	TRIM47	TUT1
C10orf62	RET	C12orf49	MASTL	LOC100287896	GPR21	GRID1	GCSH
EGFR	MFSD2A	MRAS	CLDN12	PXYLP1	BLMH	ANKRD18B	XDH
SIRT5	WWC1	UNC119B	PHYHIP1	TMSB10	TDRD3	CCDC9B	ECHS1
RNF152	RDH16	KIAA0513	HPRT1	CHD8	ABCA6	HTRA1	GLTI1D1
AGL	TRIAP1	ETV3	RAB13	LOC102606465	FAM19A2	RAB32	ABCC6
MIR99AHG	PTPA	CAPN2	ARL3	MSL1	FARP2	RHOQ	GFOD2
SLC16A4	ARRDC4	SNX11	ZSWIM5	DDB1	ARHGAP29	FSIP2	CLK4
AMDHD1	ATAD3A	TXNRD1	ABRAXAS1	SCAF8	SNORD115-27	NR2F6	KCNG1
STPG2	STAG3	RAP2A	TOR1AIP2	RPL19	PWAR6	MIR34AHG	DECR1
MT1HL1	TMEM154	PDIA6	GPANK1	MYO9B	TBX3	SKIL	CXCR4
SH3RF1	HSD3B7	PTGFRN	KBTBD3	TOP1MT	SWSAP1	FLII	CADM4
C11orf65	PRKCE	FAT1	WDR19	EP300	MBTPS2	FBXO2	OTOP2
PSD3	AGPAT2	AJUBA	NT5C3B	CRNKL1	MIR101-1	RNPEPL1	LOC101928881
CNKSR3	HPS5	CTSB	ASAP2	NTSR1	HERC5	ALPK2	ACOT12
HMG3	PRSS8	HILPDA	PAPD4	NIFK-AS1	HELZ	TSPAN3	MTHFD2L
PIGV	MFNG	CENPK	C1orf131	GPSM2	ABCB11	MSN	TSPY1
FGD4	GPC1	TSPAN17	WBP2NL	SMIM17	KRTAP19-8	R3HDM4	ZNF646
MYOT	DMTN	TMEM147	CBX7	RDH10	FBXL4	PAG1	NHLRC3
HAL	PLIN2	C5orf24	MED13	RTN1	BAAT	GATAD2A	LMAN1
ADGRL2	GPDI	EPDR1	LINC00910	HIC2	RBMS1	NOL3	GALNT3
CBR4	CDH15	NUP93	FOPNL	CENPQ	CA14	ANKS1B	LDB3
MYO16	LTBP1	ARF4	PDPR	MON1B	MT1IP	LINC01599	IFT122
ABCA8	POM121L9P	SPRTN	DISP1	DTNBP1	LINC02145	SCD	GP1BA
HOGA1	CYP4F35P	LETM1	MAN2A1	C2orf49	NKRF	P2RY2	TMC4
SLC1A2	CCND1	P14K2A	GPR88	ZNF446	HSD17B11	KDEL3	LOC101928894
ST3GAL6	SYT7	LSG1	TMBIM4	COPRS	VSNL1	TNFRSF12A	OR7A10
KLF12	SREBF2	PGBD1	BACH1	CCNB1	GSAP	OSGIN2	DLEU7
ALDH7A1	TRIM14	CGC42SE1	IFT81	ZEB1	UBQLNL	MYADM1	CHRNA10
USP53	DTX4	SATB2	FOXP1	DNAJC3-DT	ALOX15	TTC31	STYK1
CENPC	RHOD	RRP36	TRIT1	ANAPC4	AHCY	GMPPB	SLC6A11
MT1X	CES3	MPV17L2	NUP43	TMEM42	SNORD115-31	MGAT2	EPB41L4B
SLC7A2	GADD45A	TMEM214	SNAI2	LOC93622	SLCO1B7	TAF13	CNGB1
ABCG2	SLC22A7	ARFIP2	ZNF383	CYTH1	ZFHX4	AP5B1	CCNI
HGD	WNT11	LASP1	PNPT1	MORC3	MORC3	TP53INP1	MBD3L2
FPGS	SLC25A20	HLA-F-AS1	CGDC97	MIR32	MIR32	MIR142	MGC2889
SEPSECS	GLDC	CDC7	CCDC28B	NANOGP1	NANOGP1	XAGE-4	WISP2
IGFBP1	RPS6KA1	SKA3	MSRB3	SNORD116-14	SNORD116-14	ABCB4	HS3ST3A1
PANX2	ABCA2	ELOVL2-AS1	XK	LOC101929163	LOC101929163	ABCA7	CPXM2
FAM162A	GAS6-AS1	PRKAA2	AGPAT1	ZNF818P	ZNF818P	PNO1	LOC644090
ACMSD	AKR1A1	EPPK1	THRAP3	RBL2	RBL2	MARS	C12orf66
CDFN	GAS6	ZNF174	INIP	WDR64	WDR64	PAF1	TBX10
RND1	PLAUR	PREB	LYAR	MTUS1	MTUS1	SEPHS2	UTY
DAPK1	MEP1B	CDK2AP1	GSTCD	LOC646976	LOC646976	SPTSSA	LRRC71
GPAT3	KLF11	SEC24C	COP57A	ADCY10	ADCY10	DAPK3	REEP6
C11orf54	DNAJC22	WIP1	TNS3	KANSL1L	KANSL1L	TNFRSF10A	SLC26A1
GLS2	SGCB	HNRNPAB	IGSF3	INSIG2	INSIG2	NTAN1	RGN
CYP26A1	FURIN	CEBPG	PIR	ORC2	ORC2	CHI3L1	ZG16
IGF1	PPP1R3B	ZNF319	IPO9	MIR200A	MIR200A	GALNT18	ERG
PELI2	FBXO17	LRRRC59	RRP7A	LARGE1	LARGE1	ARHGEF16	NUTM2B
CYP2C19	HBD	CYREN	MED13L	LINC01105	LINC01105	RALGPS1	SOD2
MACROD1	KDM8	PPM1F	SCYL3	ULBP2	ULBP2	SGK1	MIER1
BHMT	ANGPTL8	SAE1	PTCD3	NR5A2	NR5A2	KRT8	LOC105369748
DNM1	RND3	YKT6	NAT10	FMO5	FMO5	GALNT2	FGR

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
PPM1K	VAV2	WWP2		C15orf41	KIAA1191	H2AFY2	COX15
ENOSF1	THRSP	TRIM59		SYN3	SETDB2	CTSK	CABS1
PLD1	ZMAT3	SPRYD3		SLC25A14	TNRC6C	LRRC8E	KCNK6
TIAM1	MYD88	PDIA4		UBA1	C1orf189	SNORD7	GDA
NR1I3	PXDC1	SEPT8		HEIH	MIR107	ARL8A	AQP9
RP56KA6	GZMA	HMG1		C20orf27	SNORD116-6	COL5A3	SEMA4D
ALDH6A1	NPC1L1	KPNA2		OR7A17	ZBTB44	IP6K2	FER1L6-AS1
KCND3	CHST9	ALDH18A1		MAPKAPK2	UBR2	SEC16A	NOSTRIN
PPP1R32	VNN1	HYOU1		ATXN10	DAAM1	LDLRAP1	LOC101927769
TRANK1	PRRG2	DYNC1H1		UFSP1	ATG2B	CYP4F22	PDLIM2
OR3A1	SASH3	CDG6		DHRS11	HNMT	CTNS	PHYHIP
ACKR2	SERPINE1	SULT1C2		CCDC34	SPDYE7P	MOGAT3	SFTA2
GPT	KLF10	ZNF79		TAOK3	MEIS2	UQCC3	RNF185
EPHB1	APOL3	ANKRD52		STK25	TSPYL4	HIST2H4B	FER1L5
GCDH	ABHD6	IKBKG		RABGGTA	MIR9-1	NEK8	NR4A2
APOF	COL6A6	SEC13		BRCA1	ZNF334	EXTL3	LRRN1
ANGPTL1		PLIN3		CDC25B	WT1-AS	KRT18	TMEM174
PDE7B		SPP1		EIF4G3	BAMBI	TST	PPCS
SDS		ANO10		ZNF623	ZC3H6	YIF1A	C4orf3
CASQ1		KNOP1		ATP5MG	TTC12	STK11	TMEM132E
AASS		FBXO30		NOL8	SPAG9	IL32	EVC
GYS2		BSG		LOC100129917	NFATC3	ADAMTSL5	DUS2
C8orf46		WDR45B		HIGD1B	SLC6A16	SPSB1	SORL1
AKAP6		ATP9A		BAZ1B	SNORD115-38	STXBP1	NFIA
BAZ2B		TYGB		ROCK2	BTBD8	MTCH2	ARL6IP1
NSUN6		PDGFA		SNX16	HIST2H2AC	ME1	FIBCD1
ABCA9		SLC35A2		CCDC66	SPINK9	B4GALNT2	TMEM184A
SMCO3		EHD4		BBS12	MOCS1	LINC00526	LINC00210
CPS1		ELOVL2		PHF20	MIR9-1	SLC22A2	SLC22A2
KMO		NPL0C4		EED	ZNF577	VAMP8	SERPINF1
ELP2		NACC1		PDCD5	ZCCHC6	CTNND2	WDR34
HSPA12A		SDE2		ATL2	TBCEL	ACOT1	CACNG5
SLC19A2		FAM53B		DGUOK	NHLRC2	PHLDA3	ECH1
OAT		FASTK		FGGY	APOL5	DPYSL2	HMX1
GPR162		INPP4A		LINC01138	SCARNA9L	FASN	FAHD1
SFXN2		FAM111B		LOC101559451	ZNF808	SAMD12	C9orf43
SLC23A2		GNA12		C1QTNF3	CTSE	KLF16	CCL22
EFHD1		MID2		RBM17	CEP170P1	HIST2H4A	PCAT19
CAMK2D		LPCAT1		NUDT1	AFDN	LDLRAD4	LINC02201
MT1M		GINS2		ZNF212	GUCY2F	MXD4	PTPN22
USPL1		PIP5K1		ACBD3	TFPI	TBC1D22B	KIAA1210
KYNU		JPT1		SUPT4H1	P4HA1	PLCH2	FAM129C
LGSN		RFX5		CEP350	ABHD17B	KCTD5	GEN1
CTH		MID1IP1		TRAF5	SLC10A5	P2RY1	TMC3-AS1
PFKFB3		GOLM1		ST8SIA6-AS1	C16orf87	CALR	LINC01360
IL1RAP		DUSP7		SMYD3	NRXN3	C1orf122	CYP2D6
ADRB2		SLC39A7		RAPGEF6	AGPAT5	ABCB5	SLC26A10
DNAJC12		MAN2A2		WDR45	TESK2	HEATR4	CRYGC
CTNNA3		MRGBP		CAVIN3	TNP1	LAMA5	STX8
FUZ		ZFP69B		DCAF4L1	PMCHL1	RGS9BP	RUNX3
AADAT		LRFN3		RBM10	TMTC1	ANXA5	WDR89
VIPR2		PTRH1		MFF	DEPP1	SNORD12C	LOC401324
ADGRG6		PLXNC1		NOA1	SNORD115-32	EIF4G1	LINC01346
FERMT2		MTOR		EXOC3	GUSBP4	ODF2	PRKCB
WBP1L		THTPA		STK17A	ENPP3	SERTAD3	NOXO1
RORA		FEM1A		HIST3H3	OR52H1	FAM83G	ACSM3
ACADSB		GM2A		NCOR2	ZNF506	CEP78	SIGLEC8
TAT		STARD3NL		C2CD3	SNORD116-13	ANKRD36BP1	A2M
RTTN		CYTH2		CNPY4	ST3GAL1	VPS18	CDK20
ABAT		SIPA1L3		CHRA1	ZNF141	SLC27A4	GRPEL1
SMOC1		SLC4A2		ZDHHC6	SLC16A12	RGS9	USP6NL
JMJD1C		CABLES2		CTDSP2	ATP1B1	BCL3	RELT
PAIP2B		MANEAL		CCNE1	LINC01973	CD300E	ABCD4
MAT1A		TES		RMND5B	TNFSF10	GORASP1	ANXA3
C11orf1		TXLNA		TIAL1	ANKAR	ATP8B1	VKORC1
NAF1		SPATS2		FOXM1	MAGI3	SNORD52	ELANE
HEY2		PGP		AP3M2	TMEM161B		TEK
ENPP1		APIP		BUD31	GPR52		TRPM6
GPT2		TMEM45B		USP14	LOC100419773		CD160
CEPT1		ITGB1BP1		DSTN	HSD3BP4		TERF2IP
FAT5		PSMG3		FRS2	C4orf36		GRK5
NUDT9P2		JMJD6		PSMG4	C11orf71		HES1
SLCO2B2		NAT9		LINC00328	LRIG3		CLC
PYY		ZBTB33		RNF4	RP1		RAB33B

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
BCHE		POLE2		CDK8	SNORD116-23		TMEM52
CPEB4		HSPA5		NRARP	OR13C3		FAM170B-AS1
		SRPRB		LOC642852	SMPDL3A		RFPL2
		ADCY6		KIAA1211L	NAPEPLD		LINC01782
		DR1		GRB2	MTMR10		SRRM4
		AAGAB		TPM3	DSG1		FOXP3
		RNASEH2A		ATXN7L3B	PTCH1		LOC389199
		IRGQ		HIKESHI	TADA1		LOC100506098
		DTL		DUS3L	PDXDC2P-NPIP14P		CST7
		PLPP5		HSPD1	FAM227B		SELL
		PFN1		EIF1	SNORD116-11		LTBP4
		UBP1		CETN3	AFF2		GFPT2
		INHBC		FPGT	SPATA25		LINC00261
		MKL1		CDK1	SLC2A12		KCNC1
		CYB561A3		CCAR1	ZNF69		CCL19
		LIG3		POLR2B	SCN2A		LOC100505555
		TTC9		CCDC43	ZCCHC8		STARD5
				TMPO-AS1	EYS		DNAH17
				LINC01560	CDH23		DNAJC15
				RPS28	NT5C2		ABR
				ZNF232	FAM221A		FOXE1
				GPN2	KRTAP10-10		LOC101927907
				RPS11P6	L3MBTL3		CNGA3
				CDIPT	SEMA5A		GML
				TUBB	SNORD116-29		LOC440792
				GAS2L1	FAM110B		NAT8L
				TOR3A	DCAF12L1		KLK8
				PMF1	SNORD63		NEFH
				TMEM255A	KIAA0825		PODN
				RFX3	NLRP14		PKDREJ
				CHMP1B	DNAJC19		TLR8-AS1
				PMM1			C11orf88
				CBLL1			CFAP157
				MAP3K13			ROR2
				SETDB1			ZBTB48
				LCMT1			NPY6R
				VAX2			OSTCP1
				TONSL			ZNF385B
				INTS1			ETNK2
				ARL13B			ANGPT4
				TJAP1			TNNT3
				ORC1			C12orf40
				LOC100287497			NR2E3
				RNF139-AS1			C6orf15
				GMPPA			KCNIP2-AS1
				PTP4A2			EPB42
				ZNF284			ORM1
				SEC14L1			NTHL1
				C12orf75			N4BP2L2
				CHFR			MZB1
				TAF12			COQ9
				NDUFS4			OPHN1
				THADA			SLC6A7
				PIK3CB			SHBG
				TBC1D17			CDKN2A-DT
				COX8A			LYZL4
				SF3B6			SLC16A5
				CDCA4			RARRES3
				TOMM34			WBP4
				LIMD1			CD82
				CARD8			PIRT
				C9orf16			LINC00605
				XRN2			FBXL19-AS1
				LOC101926913			NFE4
				FUS			BCL2
				RSRC1			MMP16
				TOX3			BIN3-IT1
				NIPSNAP3B			LOC101927043
				COG1			HCRTR2
				CLCN4			HBZ
				CXorf56			KCNMA1-AS1
				POLR2J4			CAMTA1
				PWP2			C3orf56
				PSMD11			SAMSN1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				MTMR14			SPZ1
				DNAL4			FAM198A
				USP42			AIPL1
				RALY-AS1			IL24
				IPP			LOC101927516
				POLR2J			WDFY2
				SEC23IP			DUSP5
				CNOT1			EMILIN1
				SNX6			NME8
				DDX18			ID1
				ZBTB11			COL18A1
				SPTBN1			FCN1
				EXOC2			TNXB
				LSM4			ATP11C
				HSF2			A4GALT
				SAMM50			BIRC7
				TMEM104			FAM110C
				SRP72			CD6
				HLA-J			ZSCAN4
				LINC02035			CRHBP
				MTX1			LOC101927814
				ZSCAN32			CELA1
				LOC105375172			NPR1
				ATR			AQP2
				DDX49			LOC101929526
				BRK1			ALAD
				ARL16			SLC9A9
				GNA11			F7
				CAPN1			RTL3
				FSIP1			SLC13A4
				DDHD2			RCSD1
				THAP1			LINC01679
				FAM204A			RSPH4A
				UPF3A			UQCRC1
				LAGE3			TFR2
				LINC01186			B3GALT5
				UNC13B			FLJ33534
				TLL4			PRR22
				ZNF687			TSPAN7
				MYO5C			PTPN5
				BTF3			MFN2
				ANKRD49			IDO2
				METTTL21A			LOC101929172
				USP32			RHOH
				QKI			NUCB1
				SETMAR			CYP1A1
				MED27			PCDH18
				MAN2B1			GNRHR
				OFD1			DPYD
				ABHD12			PPBP
				AHCYL2			HTR3A
				HABP4			ZBED1
				CTC-338M12.4			DNAH17-AS1
				VPS25			CROCCP3
				ASNSD1			CACNB1
				UBN2			LDHAL6A
				COL7A1			NCAM1
				HIST1H2BJ			LINC00619
				GCA			ACADL
				MUTYH			PRDX4
				CENPU			GPHB5
				RP9			IZUMO2
				ZNF655			KRT71
				GPATCH2			DAPP1
				ZNF227			KDM4B
				NEU1			TMEM125
				QRICH1			CNTN2
				WASHC5			CHRN2
				CENPX			NFIL3
				HP1BP3			LZTS1-AS1
				IPO13			FUT4
				TSN			DBH
				OSR2			TFAP2B
				KLHL7			DNAJA3

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				COMMD5			ECEL1
				GMFB			LOC105376944
				SLC9A3R1			CIITA
				ANKLE2			CLDN6
				AGTPBP1			FANCC
				NOP58			L2HGDH
				LOC101928565			ADGRD2
				WASHC3			TTY7
				CIP2A			KCNQ5
				SF3A3			LINC00851
				HCFC1			PLCXD2
				NFYA			SELENOP
				GORAB			KRT222
				PIGF			LINC00557
				AHNAK			CLEC4GP1
				KIF14			SPACA6
				ACTR5			PCCB
				RGS14			SPRY2
				OSGEP			MRM3
				SMC6			TPBG
				TRMT6			GSTP1
				DUSP18			HDHD2
				RSU1			CCR3
				PPP1R37			CDHR5
				MAD2L1			GNB4
				EIF4A3			SPATA4
				TMEM161B-AS1			ALDH1L2
				ZFHX4-AS1			SLC39A5
				PRPF3			PRR5
				ATP6V1C1			PCSK6
				E4F1			LILRA6
				PXN-AS1			CHMP7
				RPS21			REM2
				CAMSAP1			DNHD1
				IRX3			ADRA1A
				RTCB			LOC439933
				NMNAT2			BST1
				CYSTM1			SLC3A1
				UBE2N			LOC101928858
				IGSF8			PBLD
				NRF1			LINC00486
				SPINK5			NCR2
				PAQR4			DEFB125
				IFI27			MIR3945HG
				SKAP2			C2orf92
				TRAF7			PTGER1
				MAGOHB			C10orf99
				MOB1B			FHL1
				HS1BP3			IL17C
				C1orf112			ARMC6
				OLFML2A			TTY14
				PARG			HK3
				MICALL1			LINC02431
				UIMC1			C17orf53
				KIN			LPIN3
				DUS4L			MYLK2
				ZMIZ1-AS1			LOC101927623
				STRIP1			DLEC1
				CCT4			XCR1
				ZNF738			ELFN1
				FSTL5			KCNA4
				PDAP1			ARID5A
				ZNF146			SORBS2
				NDUFA13			TTC41P
				ATP23			IL23R
				NPFPR2			FOXCUT
				LINC01114			SH2D2A
				NENF			KLF4
				SCAMP3			IFITM10
				ZNF324			KLKB1
				MTMR6			C16orf71
				TTC13			PRDM12
				GTSF1			NEGR1-IT1
				CUL4B			ARMH1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				CENPJ			LINC02426
				ZNRD1			JADE1
				TNRC18			HP
				FAU			BTK
				ATP6AP1L			SYTL5
				PDGFRB			TJP3
				IL17D			MT1G
				FHDCl			PIGL
				GPR158			MRPL57
				VRK2			OR2B2
				RDX			HAPLN4
				CELSR3			GOT2
				FGD5-AS1			FXYD2
				DNAJC9			GALR2
				FBXO46			LOC101927972
				ZNF568			ZCCHC12
				SVIL			ATP7B
				CELF5			PPM1H
				DCTN1			RIC3
				LIN28B			PLSCR4
				TNKS2			TBX21
				MRT04			ECRP
				TMEM248			GGN
				CADPS2			ZNF709
				SEMA3G			KCNK10
				PSTK			LINC02314
				TRIM45			UPP2
				OSER1			LINC01093
				CENPL			VMP1
				SLC51B			MIA2
				TLK1			MRPL41
				KLHL21			HOXB5
				PI15			TMEM238
				RER1			HRH2
				ELAVL2			LINC00313
				PMVK			LOC101929248
				EIF3D			SLC34A3
				GPATCH8			OMD
				MPC2			SLC4A5
				KIF4A			JUND
				FAM161A			ITSN1
				RNF7			CHRN1
				POLR3G			NDRG2
				SNRPC			CAMK2B
				CPD			FETUB
				FBF1			LOC101929897
				PELI3			APBA2
				SET			MUC2
				LOC153684			ADAMTS9-AS1
				FAM193A			IL23A
				FBXL20			GRHL1
				FAM120A			TCF21
				SLC38A9			SRMS
				SERP1			JPH2
				SH2B1			SLA
				LAMTOR3			AMELX
				NUP85			RGS20
				EIF2S1			CMA1
				PIGG			TRAM2
				POLR1A			HCRTR1
				LGR5			VWCE
				BICD1			CFC1B
				TERF2			PSD2
				METTL5			ARHGEF26
				GTF2H5			TEX33
				PLEKHM3			TIGD2
				ZNF414			IGLJ3
				LOC100130987			PREX2
				CH17-340M24.3			LDLR
				MYCL			LOC101929154
				ZBTB80S			UNC5B-AS1
				RAB15			LOC101929229
				HBP1			PROSER2
				PLA2G4C			KLF2

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				JRK			TAB2
				XPO4			TNFAIP8L3
				XIAP			METTL7B
				TLX1			ZNF511
				GPS1			LOC730098
				BDP1			PGM1
				SPAG6			ZNF586
				ZBED6CL			NAV2-AS4
				RPS29			HLA-DOA
				THOC7			DLGAP1
				ATP6V0A2			MIPEPP3
				LAMTOR5			PGLYRP1
				RAB11FIP4			LOC645261
				TALDO1			UPK1B
				NF1			DNAJB4
				IMPAD1			NAB2
				SQLE			LIMD2
				OPN3			NTN4
				YTHDC2			PECR
				EMC3-AS1			ASCL2
				TCF19			WFIKKN1
				MAP4K3			PCDHGA10
				MCM10			SYDE2
				NUP133			SHH
				XXYL1			THPO
				TPGS1			RAB20
				FGF12			TNFRSF17
				GRPEL2			CD177
				MICA			EDDM3B
				TRIM56			DPYSL4
				FIS1			LOC574538
				HNRNPK			TNFRSF1A
				LOC284561			SHISAL1
				TCFL5			LINC00901
				TLR5			DCAF11
				CLIP2			CASP1
				PPCDC			ACADVL
				BTBD9			CD8A
				NCSTN			LINC01282
				PARP4			PHGDH
				ICE1			LOC102724165
				SAFB2			ARHGAP25
				VPS16			GPR62
				OXA1L			PRSS30P
				GK5			ANKRD20A5P
				SLC35B1			KALRN
				FMO9P			GPR174
				IGFBP2			CCDC60
				CD93			ZDHHC22
				ADD1			LOC692247
				TOR2A			IFNAR1
				ZSCAN12			SDHD
				PSMD12			OSM
				TTC28-AS1			C6orf141
				ANP32A			AADACP1
				TRPC1			LOC100128594
				TRAIP			CLMAT3
				MEX3D			PPFIBP1
				KIAA0232			NEGR1
				ERCC8			B3GALT5-AS1
				SMS			TRIM63
				CHCHD5			SPG7
				VIRMA			AGER
				RRAGC			SAT2
				TAF1D			CBS
				NUB1			RMDN3
				SRGAP2C			INPP5B
				RTL8C			PPID
				WIF1			ELF1
				PCED1A			FAM71A
				MSS51			LINC00868
				TYMS			CLPS
				TMOD2			AZGP1P1
				FAM199X			MUCL3

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				ITPR1-DT			LOC339352
				DGKQ			GALNT9
				MCM5			CD83
				ZFAS1			GCGR
				ALG9			SLC16A2
				NOL4L			FOXRED1
				TMEM106C			HHIPL1
				RPL39			PRSS37
				BTBD10			SC5D
				MELK			SIGLEC1
				RABGGTB			SLC9A2
				CUL3			LOC100506472
				PODXL			KDM6B
				ANKRD40			CLEC4M
				CALCOCO2			TUSC7
				FAM122B			CLDN10
				YPEL1			GYP A
				SLC48A1			CCDC144A
				CDK16			HPCAL4
				GEMIN6			USP43
				HRAS			CYP4F12
				ARSK			PARD6A
				RBP7			GCH1
				RNF43			LOC101928323
				PHF12			SCNN1B
				PHPT1			ECHDC3
				CDKN2B			GPRIN2
				ERH			MEGF11
				SRRD			SDK2
				SOCS4			KCNK7
				XRCC1			PTP4A3
				PARVB			LINC01149
				NDC80			KRT74
				LINC00622			COMTD1
				ZBTB41			MUC20
				NRSN1			SNCA
				AHCTF1			CLIC5
				CDS2			ITK
				ITGA2			LINC00882
				LIPT1			HBQ1
				C2orf69			DNAJC4
				VAT1			KLRC4
				CCDC14			BSDC1
				NSUN5			JAGN1
				SF3B5			DEFA5
				CEP72			LINC00641
				KCTD2			NDUFAF1
				WDR26			MAP2K4
				SGSM3			FOLR2
				DNAAF5			SPATA32
				SUPT16H			LINC00527
				TOMM22			LEMD1-AS1
				MUS81			TEKT2
				UNKL			LOC652276
				POP4			MAP3K6
				OIP5			LOC100506990
				CCNA2			PROS1
				C22orf23			MAS1
				DNASE1L1			CSRNP1
				LOC100289361			LINC00896
				C19orf44			LAMA1
				LINC00494			MORC1
				RUVBL2			APOL1
				CGRRF1			LINC01875
				DPY19L2P2			MGC34796
				SPNS1			GIMAP6
				TRAPPC6A			AREG
				RPAP1			ACTRT3
				RPL27			MME
				IL1RAPL1			TEX26
				VPS50			LINC00567
				NIPA2			KANK4
				MFSD14B			MAST4
				GPR160			CAVIN2

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				SCGB1D2			DCTN1-AS1
				SP4			THEG
				SLC25A39			MYC
				EIF3H			ABHD16B
				GSK3B			ZNF18
				GNGT1			NRXN1
				C6orf120			NR4A3
				PIGT			PHYH
				PSRC1			SOCS3
				ATG3			GGT6
				CRLF3			GAS1RR
				PSMA5			AGBL1
				PIAS1			LINC01213
				TSEN54			LOC101929007
				MMP1			SOX15
				CA12			TMEM132A
				NCOA6			LCE1E
				ZNF3			ARHGAP10
				HMGXB4			VWA3A
				OTUD6B-AS1			SPIC
				FKTN			PIANP
				UPF1			WNT10B
				CRTAP			RPLP2
				DDX50			LOC101927948
				SNW1			GATD3A
				ZNF75D			ZFP1
				RPP30			C21orf2
				TRIM16			EPN1
				LINC00662			CEMP1
				STMN1			LINC00908
				DMAC2			NKX2-1
				GTPBP2			GBX2
				GALNT10			SLC23A3
				CRNDE			BGN
				LOC91548			PJKK
				ELK4			APOBEC3F
				MKKS			THEMIS2
				STK39			TRMT9B
				TRIM6			SLC11A1
				CD109			PCYT1B
				CKS2			KIF9-AS1
				BANF1			ABHD14B
				SMURF2			VPS37B
				HMBS			AMOTL2
				MRPL22			KIR2DL1
				GPBP1			LOC284395
				ACER3			ALAS1
				PES1			FOXO1
				AVL9			CBLN2
				TDP1			NDUFV2
				LOC644656			DUSP10
				TCTN3			GPM6A
				TBC1D16			SMIM1
				TRIM24			CLCNKB
				WFS1			CCDC28A
				ZNF571-AS1			SPATA16
				CC2D1B			GLTPD2
				PABPN1			ADCYAP1R1
				GBA2			CDH20
				SLCO1C1			FSD1
				NDUFB3			MAGI2-AS3
				SLC22A5			SPINK13
				DEPDC1			CFAP20
				CHTOP			ST6GALNAC3
				KIF23			PDE6G
				ZNF165			STH
				ZDHHHC17			ZC3H14
				NDE1			CBX2
				QSOX2			TP53TG3HP
				KDM4A			ABI3
				URB2			LOC102724511
				YBX1			SERPINA4
				PHAX			ZMYND10
				ANXA2			ZSWIM4

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				STK24			WNT16
				AAAS			SATB2-AS1
				SSX3			LOC148696
				ARMT1			LOC642696
				PTPN23			IL18RAP
				MTF2			SLIT1
				GSR			A1BG-AS1
				FIG4			SLAMF6
				FAM20B			PRRX2
				ATP6V1F			LINC01922
				PDCD6			LINC01838
				GSEC			ERVV-1
				LOC100499489			LOC101928590
				DCTN4			CFAP74
				INTS7			ACOX3
				ZNF775			ADCY1
				PLBD2			OR9A1P
				BRJ3BP			RHO
				EIF2AK2			SRL
				AP1S3			CR1
				UCKL1			FAM13A
				NUTF2			EBP
				HNRNPH1			SH3PXD2A-AS1
				GOLGA7B			MRO
				SLC12A7			SLC25A15
				MRM2			NUP210P1
				ZNF84			CCDC129
				RBM4B			SERPINA2
				HOXD8			KLHDC1
				LINC01139			PLPPR5
				MDC1			UCP2
				GPIHBP1			ZNF287
				METTL18			DPPA2
				PYCR3			FOXG1
				ASH1L-AS1			PROC
				POLR3A			ERVH-6
				RPE			FLJ34503
				PCDH12			FPR1
				SIGLEC15			LOC100506790
				EXOC4			ASPN
				SPRR2C			GNLY
				HEATR5A			LOC101928739
				TCHP			LOC100506258
				CFAP36			USP38
				TRMT1			ANKRD65
				KMT2D			SERPINB11
				LOC101927365			ARMCX3
				GUSBP5			VNN3
				WDR70			ITGA10
				ZFAND1			FSHB
				LMNB1			GCSAM
				RINT1			CLNK
				MAF1			SCTR
				PCDHB14			SYNP02L
				SPAG5			ABCD3
				F13A1			MIRLET7DHG
				DUSP28			PARVG
				BRCA2			NEU2
				SRP14			EGR4
				PPP5D1			MAP3K14-AS1
				XPO6			SPRY4-IT1
				PIK3C2B			LOC101926960
				FMR1			KCNH3
				CCDC117			AMPH
				C6orf89			DBH-AS1
				CHMP2A			LINC00900
				TUBB2B			DCST1
				C7orf50			CCL23
				RTN4IP1			OBSL1
				ENTPD6			THAP4
				SLC44A3			OGFRL1
				MELTF-AS1			LINC01554
				ESAM			PPP1R15A
				HAUS1			CITED2

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				MIR34A			CCDC197
				IFT172			KRT9
				ST7L			FNDC4
				CTNNA1			NKAIN1
				PKN3			HTR1A
				COMMD1			ALOX12
				IRAK2			NEIL2
				CBX4			TMEM255B
				TXLNG			ADGRE5
				TMEM182			F2RL2
				PXMP4			EXOC3L4
				CEP290			ZDHHC1
				PRMT5			LOC100996506
				FAM171B			IMPG2
				RTN2			HTR4
				CNTNAP3P2			LINC02044
				DCAF4			URGCP
				DXO			EMB
				CHKB-DT			LPAR3
				NFKBIL1			C3orf49
				UQCR10			AXL
				LHX4-AS1			ATP2C2
				GPSM1			RRN3P3
				DPM1			CD276
				RPS10			FAM19A5
				PSMB7			KIAA0408
				WDR92			KRT80
				EFL1			DNAH7
				SHQ1			SLC10A1
				C5orf51			LINC01587
				LOC102723648			LOC101927709
				BIRC6			ACADM
				RFT1			KCNQ4
				ZNF16			GIPC2
				TACC1			LOC100132686
				SH3PXD2B			AKR1E2
				OCLN			CXCR1
				PTBP3			LOC101927914
				EPC2			LOC101929570
				ATP13A2			CR1L
				SCG2			CEND1
				TRIM4			RNF31
				MMP14			FNDC9
				SERPINI1			PTGER2
				DYNC1LI1			SLC5A7
				CAPNS1			FAM184B
				NLK			SDSL
				FASTKD5			MMP8
				EID2B			SLC31A1
				TAP2			GNA14-AS1
				THSD7A			EXD1
				C19orf70			NPIP15
				GNAI1			ACY1
				LOC100506282			LOC101930421
				ZC3H8			MT1E
				FBXO9			GFOD1
				APPL2			GPR20
				TNPO1			RFPL3
				MRPL13			GHITM
				SNX5			CCDC3
				METTL6			NTRK2
				BBOF1			ADCYAP1
				AFAP1			LOC100996349
				PRKD2			SH3BP2
				CHML			PNMA2
				PAPOLG			IL10
				BCR			ANXA10
				PIK3IP1-AS1			RNF167
				SEC22C			IRX4
				TIAM2			TSKU
				ERFE			KRTCAP3
				TWISTNB			TLR10
				ZNF317			HIC1
				INTS6-AS1			ACR

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				HIST1H2AJ			CBLL2
				CCNB2			LINC00454
				WDR74			RIPK3
				PURA			C19orf18
				PCNP			SLC8A2
				ZSCAN21			ITGAD
				RPL15			ADHFE1
				APTR			NAGLU
				TRAPPC11			KRT4
				PRC1			DDI1
				CREB1			IGKC
				C9orf57			SH3YL1
				TRAK2			PADI4
				LGALS3			FMO3
				RASA2			PKD1P1
				STAG1			NETO1
				PIF1			IPPK
				ABCF1			KLHL15
				RBSN			NDST3
				CDT1			OVCH1-AS1
				UFD1			CXCL2
				FCF1			AKT2
				CFAP53			DHRS12
				GUCY1B2			SESNI
				APOOL			LOC90246
				SMARCA4			GBE1
				ZNF624			MRPL46
				MRPL14			RASGEF1B
				CENPW			PLGLB2
				ZNRF3			NCAM2
				GPATCH3			PACS1
				BBS4			FAM187B
				NFE2L3			ZFP36L1
				QRICH2			PUS3
				TMEM181			OR51B2
				PFDN1			NKX3-1
				CLPTM1L			NR4A1
				HS6ST1			ZNF10
				MEOX2			TRIM17
				TTL			RORA-AS1
				EML4			TIGD4
				ZBED9			GALP
				LINC01242			ERBB2
				PSMD6			ADAMTS8
				SSB			LINC00589
				ADGRG2			NAA38
				RTRAF			STAB1
				SHISA4			CEACAM5
				SEC61G			ASPDH
				ZNF544			CFL2
				TRIM11			GIMAP4
				NACA2			FUT3
				TMEM50B			UPB1
				HM13			NAP1L5
				TCERG1			LAT
				ATXN7L3			KCNA3
				MPP6			CNMD
				DBNDD1			CLDN14
				FAIM			12-Sep
				UBE2O			LPIN2
				G6PD			CD28
				SMIM26			TRHR
				ANKRD36			TPSB2
				DDIAS			FAHD2A
				RPRD1A			MASP2
				UBL5			LINC01968
				TMEM251			ZBTB21
				TMEM126A			IGHV1-69
				SCARA3			PSD4
				EIF3J			TTL9
				ZNF541			CCNB1IP1
				TMEM167A			RGS11
				BCAT2			AKR1D1
				RTCA			TTC39B

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				MFN1			LINC00304
				COMP			ENPEP
				ZNF865			LOC101927358
				APOO			SH3D21
				CAMSAP2			SCT
				SCLT1			LINC01526
				FARSA			SLC22A13
				PPP1R3E			AKAP3
				ABCC5			TIMM23
				RBBP7			IPCEF1
				ABL1			IGLV6-57
				PTPRG			C2orf72
				EIF4ENIF1			USP2-AS1
				FAM206A			C1RL-AS1
				PRDM10			BIN2
				C14orf93			D2HGDH
				CMTR1			CCDC17
				SRGAP1			KRT16
				CCNE2			C2orf80
				SLC6A8			KLF17
				CDC45			TNFSF8
				MKL2			GABRP
				LINC00685			CELA2B
				TAZ			PDE5A
				DAXX			CDR1
				DCAF4L2			TACSTD2
				PPP1CB			PPP2R2A
				NRDC			HBE1
				USP33			LOC105373418
				FAM184A			HBBP1
				ERBIN			FOXI1
				MYDGF			CPEB4
				MPLKIP			BCKDHA
				TAF11			LOC101927247
				ARF5			PACRG-AS2
				CCT3			PICRAR
				ZNF121			THBS1
				RAD50			IQCF6
				TRIOBP			ACSL1
				CABIN1			LINC00970
				HIST1H2AC			NCOR1
				KHDC4			MOCOS
				NCL			OR7E24
				PSMD10			SPINK4
				NCOA1			LOC100289061
				CDK7			C8orf31
				SSR2			SPATA18
				HRH1			LINC00452
				HIST1H3C			LILRA1
				CRELD1			HPDL
				C5orf30			CSN1S2AP
				CHEK2			C16orf72
				RNPEP			GPER1
				GCN1			LOC284600
				MCM2			BARHL1
				RBMX2			PRX
				CDAN1			PIWIL2
				SYT11			SYNE1
				TGS1			SNORD89
				MCM4			MVK
				SYF2			TUBA3FP
				DCAF13			MOBP
				PDZD2			LINC00598
				CEP192			IL25
				RPL9			SNCG
				SLC26A2			GPR6
				TRIM52-AS1			LINC02223
				RNF111			ADH4
				ATP2B4			GDF11
				IST1			CD247
				KIAA0895			SOX14
				KANSL3			TMEM200C
				RAB22A			HIPK4
				TARDBP			OIT3

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				ARHGAP5			FLJ25758
				B3GALT6			NTSR2
				ADAR			BTBD18
				DHX29			PKHD1L1
				PWP1			LINC01018
				PLXNB2			ZBTB10
				METAP2			SPTBN2
				STXBP4			MCC
				TCTE3			KLHL31
				NSFL1C			P2RX2
				RHOG			WISP1
				HEY1			GUSBP11
				MED15			ID2
				ZBED4			NME5
				TBC1D32			DNM1P41
				ZNF720			CETP
				CANT1			ZNF688
				LIN9			APOC2
				MTPN			VMO1
				CDK2			LINC02065
				UNC50			HADHB
				INTS13			MKRN7P
				CDC37			MTO1
				HEATR6			LOC101927131
				INTS2			LOC100996724
				ZNF99			JMJD1C-AS1
				PPP2CA			P2RX1
				LRP12			HBM
				TAPT1-AS1			GAS2
				MBNL3			CACNB2
				ODC1			PDE10A
				TMEM218			ADIRF
				LOC339803			TRAV12-2
				HIST1H2AB			LOC101928052
				JAZF1-AS1			MESP1
				MECOM			LINC01743
				POTEM			BPIFA3
				E2F2			CASR
				POLH			XRN1
				ZSCAN31			HCG9
				DDX17			RHOJ
				C11orf74			CCDC96
				LRRC1			SLAMF7
				ZNF793-AS1			ZER1
				SLC35G2			RUNX2
				CXCL10			CCDC173
				DET1			LOC101928087
				ZMYM4			SPATA6L
				ZNF532			FCRL5
				ATP6AP2			SOX1
				AZIN1			LINC01648
				LAMTOR4			SRPX
				CKAP2L			LINC01898
				FBLN7			SEC14L2
				UBE2A			CROCCP2
				CDC42EP4			SDC3
				CYP27C1			LOC101927543
				NOL7			LOC101927815
				LEKR1			LOC440570
				SGK494			SOX6
				PANK2			MSMO1
				CABYR			POLE
				SLC1A3			CAMTA2
				TM9SF3			PLEKHA2
				DDHD1			FILIP1L
				RNF139			ENO3
				RBM41			PDE4DIP
				PPP6R3			EMC6
				RNH1			LINC01492
				MAFG			RASGRP4
				PTTG3P			SCN7A
				C14orf119			ASIC4
				TOMM5			NAB1
				RPL35A			GAS1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				SHANK2			DGKA
				MFSD14C			PEG3
				C2orf68			TNFRSF18
				SLC41A1			NLRP8
				CBX3			MCF2
				MAP4K2			GALT
				ACAP2			TRPM3
				FGF13			PLG
				KBTBD2			TYR
				SULF1			ABHD10
				PPP4R2			GDPD2
				KIF3A			SLC7A7
				SLC39A10			HAND2-AS1
				ACP1			LOC101927237
				CDC23			IL10RA
				PBXIP1			KIF1A
				CXorf40B			ARG2
				ILDR2			TSLP
				CYBC1			LINC02580
				LINC02492			ADAP2
				KIAA1586			ICAM3
				ZNF252P-AS1			CNTNAP5
				RAB11FIP5			LOC100507065
				NCK1			SFTPC
				ZNF550			MAN2B2
				SNHG22			HAO2
				CHCHD6			SHPK
				MTERF3			CCDC163
				LPL			MT1F
				SPIN3			GPR150
				KIZ			LINC01187
				MPHOSPH9			CCDC157
				PLPP1			TMEM41A
				CLEC2D			OSBP2
				LINC00607			CHP1
				PUDP			MAMDC4
				PCOTH			ZCCHC2
				CUL7			LRRC18
				EIF2B1			RBMXL2
				RASA1			CLIP3
				FAM168A			LOC101929076
				MRPS21			MED15P9
				ZNF830			CARNMT1
				NONO			PRDM5
				ZNF567			UBE2E2
				IMPA1			DCXR
				NPM3			LURAP1L
				B3GNTL1			SIGLEC5
				CENPB			LOC105372762
				GJC1			EHD1
				EXO1			GGTLC1
				HIST1H4H			LINC00184
				C20orf194			RTBDN
				SOSTDC1			NMUR2
				CELSR2			NBEAP1
				ZNF37BP			EFCC1
				STAM2			MGC27382
				GPC3			GPR32
				PTPMT1			TRAF3IP3
				LOC100506022			PTOV1-AS2
				CFAP97			DRAIC
				MAGEA12			LSR
				CIAPIN1			TRIML2
				PTRH2			LIPC
				NDUFA12			DIO1
				STAMPB			GSTZ1
				ZNF668			OMP
				C22orf39			CTRL
				ANXA2P1			SLC6A12
				ADAT1			TBC1D15
				TMEM50A			PHKG1
				STAMBPL1			JMJD8
				CENPI			EVA1A
				SEC24B-AS1			QRFRP

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				TCF20			MGAT3
				KLHL20			NCBP3
				CCNF			ERMN
				KLHL5			MBP
				SRM			KRTAP4-7
				LOC101927330			ZCCHC13
				NFYB			TANGO6
				PPM1G			RPP25
				FZD3			SLC2A2
				NMT1			FAXDC2
				SOCS5			LRG1
				MVB12A			PIK3R1
				MRPL58			LRRC74A
				SARNP			LOC105372969
				DLG5			LOC101928443
				LOC101928837			SV2A
				TIMM50			MAF
				SELENON			PDGFRA
				KLC2			GSG1
				HDAC1			CACNG1
				SHTN1			SLC46A3
				NRSN2-AS1			MPEG1
				SMARCAD1			DMD
				ATG12			TBC1D27P
				FRG1BP			TMC05B
				FNDC3B			UCN3
				RNMT			HOOK1
				VMA21			MS4A12
				MYH4			SH3BP5-AS1
				LOC100147773			FPR2
				BLZF1			FAM178B
				ZHX1			CRYL1
				PMS2P2			OTC
				BOLA3			MRPS6
				RPAP2			ANKRD33B
				AREL1			CDH19
				MRPL51			SNX8
				SEMA3F			HADHA
				SUN3			CCBE1
				ARHGAP35			PLA2G16
				BCL6B			CCDC42
				UBE2Q2L			PGM5
				DUS1L			SAGE1
				NEK9			COL26A1
				C1QTNF1-AS1			C9orf135-DT
				PREX1			MTCP1
				MINOS1			MASP1
				MAPKBP1			PROX2
				ASF1A			ADAMTS9-AS2
				ZNF789			SLURP1
				HARS2			LINC01300
				TOMM40			SHOX
				GNB1			SARAF
				RPL23A			PCDHGC3
				UPF3B			FOSB
				PIDD1			KRT35
				TUBGCP5			KIR3DL3
				ADNP			SLC27A2
				UST			TMEM131L
				POLD1			FAM46C
				VIPAS39			KRT33A
				SNRPB2			G6PC
				MBOAT7			DDO
				LINC00244			DPEP2NB
				APBA3			MARCO
				ZNF404			TBX22
				PMS1			DCHS1
				NSMAF			CXCR6
				ADSS			LOC90768
				RPL31			NOBOX
				SLC25A51			CD200R1
				RAB28			CXorf65
				TFCP2			DMWD
				POLR3F			GSTM5

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RAB10			BTD
				PIGU			LCAT
				WRNIP1			PDCD1LG2
				TLK2			AIG1
				RPN2			ST6GAL1
				ZNF2			APOA4
				MARS2			POMC
				COL24A1			LOC101927752
				SDF2L1			MIR2052HG
				DEK			LOC101929109
				SFT2D2			LOC100996404
				UPF2			MKX
				JPH1			LY9
				TERF1			ATP2B3
				C6orf226			SCOC-AS1
				LOC100996740			PKP3
				EFR3A			CTSO
				COL11A1			DHRS1
				HIST1H1D			NFKBIA
				ZNF703			ANO3
				MYL6B			IGFBP3
				UBAP2			HSF5
				MLH1			TTC9B
				CDKN2AIPNL			CRTC1
				OST4			GRAMD2B
				VAMP7			SORBS3
				AMPD2			MED14OS
				MRPL36			LY6D
				HLA-C			CD101
				ELOB			ARHGAP24
				HAUS3			C16orf70
				PITPNC1			C1QA
				MKS1			DOPEY1
				KCTD3			AGBL2
				CCP110			LMO1
				PCNX3			DCN
				KISS1			TMEM132D
				MCM3AP-AS1			GSE1
				WDR83			PRB4
				DOCK7			SUCLG2
				STX6			WDR11-AS1
				HIST1H1C			UCP3
				WRB			S100A12
				TPR			LOC100130370
				BICRA			IFNAR2
				MTX2			PLA2G12A
				HIST1H2BH			CASC22
				HIST1H2BO			CYB5A
				CRAMP1			N4BP2L1
				TTC33			NRBF2
				METT17			LINC00907
				THUMPD3-AS1			RSF1
				PCOLCE2			PDE1B
				ZNF57			MYLK3
				ROR1			LONRF1
				EIPR1			C2orf88
				NFU1			DLGAP1-AS3
				UGT8			LIN7C
				ALG1			SNORA71B
				RAPGEF4-AS1			CACNG6
				HINT1			PLP1
				FAM13B			NXPE3
				HEXA			FZD4
				HNRNPU			GALNS
				USP39			TMLHE
				SETD4			CIDEB
				CHCHD2			LINC02287
				DYNLT3			FAM20C
				FKBP11			SMIM2
				SESTD1			ABCC8
				RPL38			LINC01354
				NARS			NOXRED1
				LOC101928673			MAJIN
				LOC101926944			SERPINA3

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RPS16			GOT1L1
				PRCC			XKR4
				CCDC126			KCNJ16
				ZNF675			CPN2
				CSNK2A1			STAB2
				CALCOCO1			MCPH1
				MAP7D1			MT2A
				RFC5			KRT79
				BRAF			FABP2
				NEMP1			C9orf3
				BABAM2			LOC100129129
				DDX56			SLC25A23
				TRAM1L1			BHLHE23
				MRPS18B			SAMD4B
				RPL14			SFXN5
				JRKL			WNT7B
				DTNA			KRTAP13-1
				TMOD3			FLT4
				GMEB1			CCDC178
				EEA1			FAM3D
				ADCK5			SLC4A4
				GEMIN5			KAZN
				FAM111A-DT			VENTXP1
				DDX20			ZBTB32
				CTTN			FKBP6
				UTP15			MTFR1L
				RELL2			EPO
				CCT6A			PAX5
				RBAK			LOC285097
				KMT2C			GJB4
				LAPTM4B			PEBP1
				ITGB5			AOX1
				YIPF3			CYR61
				ZNF503			LOC101060400
				NEK2			SERPINA5
				ARID1A			LINC01874
				RBM48			IL1R1
				RRAGB			UBR4
				RCN2			KHDC3L
				HIST2H2BE			AMHR2
				SLC38A11			KIR2DL5A
				STARD7			ADAM2
				WDR73			NDEL1
				ARFGAP1			EHHADH
				AP1S1			BAIAP2
				ZBTB40			LCN8
				LYPLAL1			RGL4
				TMEM206			DIO3OS
				ZNF17			GGT5
				ZNF251			ARSJ
				MAP3K9			LOC340184
				ABLIM1			RNASE4
				BTAF1			TMEM37
				MAST3			SIGLECL1
				RPP38			C1orf162
				TFAP2E			TPD52L3
				RHBDD1			SHMT2
				PGBD4			MLYCD
				DRG2			VWA3B
				ZNF22			FLVCR2
				CPSF2			CH25H
				ISCA2			SDHA
				C15orf61			ALPL
				RDM1			SMAD6
				PIGM			VRTN
				FANCD2			SAT1
				ANKZF1			LINC01210
				ARL6			ADAMTS7
				ACTR2			RCBTB2
				TRMT2A			YPEL2
				HMGB1			ZNF445
				ZNF519			RYBP
				HOPX			UQCRC2
				SENP5			UGT2B28

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				EIF2D			FAM171A2
				LBR			HYAL1
				PSPH			KLRB1
				METTL1			CLDN10-AS1
				AFF3			NLRC3
				CCDC51			PNP
				DARS2			MAPK8IP1
				MYB			ZADH2
				CEP295			ST6GALNAC1
				ESM1			GNB3
				BAIAP2L1			ACY3
				MMS19			HECW1
				GMMPR2			LOC102723831
				B3GNT5			HECW1-IT1
				TBC1D19			FAM216B
				RPTOR			OR12D3
				ATOX1			SOAT2
				MAP4			CBFA2T3
				BCL2L12			CDIP1
				ACTR3			ANKRD37
				ZNF225			RCN3
				STT3A			CASS4
				ZNF485			LINC02388
				LPP			ERGIC1
				ORC3			ERBB4
				EIF4EBP2			AMER2
				RAE1			TSPAN32
				ATRX			GPHN
				LOC388780			ZAP70
				ELP4			PTN
				LYRM4-AS1			C3orf85
				DLGAP1-AS1			PTPRCAP
				STK24-AS1			IL12RB1
				THEM6			CHST8
				RPL10A			TVP23C
				BID			RNF122
				ARV1			CCNA1
				COX5A			IL26
				NMB			HSPB6
				EIF6			IER2
				POLR2L			CXCL14
				TGFB2			SEC24D
				MPPED2			WWC2
				MNAT1			MIR146A
				TMEM160			SACS-AS1
				PCMTD2			CHRDL1
				NUFIP2			CHRNE
				LINC01963			WNK2
				ATP6V0D1			EPB41L4A
				LZTR1			PRDM14
				KANSL2			LILRA4
				POLR1C			LAMA2
				TRIO			RIDA
				ZNF385D			LOC100505570
				ATXN7L1			MBNL2
				DEPDC1B			MROH2A
				TM9SF1			GAL3ST3
				ZNF85			ARVCF
				SVBP			RENBP
				CCDC110			NID1
				ZNF473			LINC00308
				GPR107			CIQC
				CLGN			MMP13
				METTL23			C8A
				RECQL			RTP3
				CTNBL1			CAPN3
				ENPP4			KDM4D
				HCP5			SLC25A37
				CLHC1			AP1G1
				SMARCC1			NLRC4
				AMBRA1			LINC02274
				UCN			ECHDC1
				ZNF764			USF2
				NAXE			DEPDC7

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				NRM			CD4
				SLC37A3			ITLN1
				SPATA5L1			PTK2B
				POLG2			SDHB
				MMRN2			CLRN1
				DSP			NUDT10
				TRMT61B			MBL2
				NDST1			FAM66D
				TPD52L2			C8orf58
				ZNF248			SLC9A5
				ZSCAN5A			SH2D1A
				IRF2BP2			PRR29
				ZNF230			DERA
				IFI27L1			FAM95B1
				THOC5			ALKBH3-AS1
				LINC00355			TPP2
				MFS6			PLIN4
				RHOF			STRADB
				SERINC3			ZFP3
				SMARCD1			AGAP11
				USP20			KCNIP3
				MCRS1			GPR83
				TBC1D31			TRPM8
				GINS3			PHKG2
				C19orf53			PRSS54
				ECPAS			GFRA4
				GTF2E1			KCNT1
				ATAD2B			SLC39A14
				DDOST			DDX19B
				LAPTM4A			RGS16
				ARHGAP17			TCIM
				GPNMB			TUBAL3
				TTF2			CLN8
				KIAA1522			MECP2
				TIGD6			PNPLA4
				AKR1B10			SMIM25
				NGRN			LAMP1
				URB1			FCGR2B
				ZSCAN30			DIP2C
				DOLK			BCO2
				CRYZL1			NFATC4
				LOC101928963			PDLIM7
				ABL2			LOC102724009
				PTPN12			FAM13A-AS1
				LINC02424			SNIP1
				PSMA1			ARPP21
				TOP3B			LOC157273
				CIB2			LOC101927610
				ACACA			MXRA8
				MAPKAPK5-AS1			HRK
				TMEM127			MOB3C
				ABHD4			RGS3
				LYPLA1			ATOH1
				RPS23			ODF1
				SLC35F6			OBSCN-AS1
				RPP40			NFATC1
				INTU			RAC2
				LNPEP			GLUD2
				RALY			UST-AS1
				SMAD3			B3GNT9
				CTDSPL2			SCYL1
				TBC1D12			PRDM9
				ZCCHC4			LINC01127
				ZBTB22			SYNGR3
				ZNF669			TBX5
				DGKH			PTGDR
				FAHD2CP			MEPE
				ZNF581			FOLH1B
				THAP10			LOC145694
				CDK12			GS1-24F4.2
				DDX27			SPO11
				PLP2			LINC01220
				PLCG1			PPP3R2
				COQ7			CACNA1E

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				TAGLN2			CEACAM8
				CHMP5			FMO4
				FAM192A			PEX14
				CACNB3			THYN1
				NEDD4			PAFAH1B1
				DSTNP2			TMEM30B
				ZNF43			PGRMC2
				MDH1			LOC100505685
				NEK4			DSG2-AS1
				PRKAR2A			CAMSAP3
				ATP6V0B			OSTF1
				TMEM150B			LINC02380
				DPH3			MEIS3P1
				RPL7L1			RAPH1
				SKP1			PRKCA-AS1
				ZBTB38			CTIF
				UBE2I			CNTN4
				FBLIM1			SOCS2-AS1
				FYCO1			CFAP57
				LOC100287015			LINC02433
				TBC1D5			ANGPTL3
				LCE1B			HRH4
				MYO6			DNAJA4
				GLRX2			LINC01990
				EZH2			DOCK8
				ATP11A			LINC01504
				RBM24			FAS
				ZFP37			LINC01159
				MRPL33			PON1
				SLC25A5			CSMD2-AS1
				RBM23			SYT5
				FAM89B			BTBD17
				SNORA21			SPRN
				ARMC1			POU2AF1
				GOLGA2P5			LOC100422212
				KIFAP3			ZNF574
				ID12-AS1			CYSLTR2
				HSPBAP1			DRAXIN
				BORA			DDAH1
				PI4KA			ACBD5
				PRKCI			ALDH4A1
				PRTFDC1			LINC01653
				GNPDA1			TIPARP
				RPL12			SPRYD4
				ZC3H3			DNASE1L3
				COMMD2			SCRN2
				C19orf25			DHRS7C
				WIZ			LINC02400
				CCDC137			PARVA
				RIOX2			JAKMIP2
				CHEK1			MAP3K14
				MIER3			NOVA2
				TRNAU1AP			PKLR
				LOC374443			TNFRSF11B
				LRRC58			TMCO5A
				NEIL3			LINC00708
				FAM241B			ITPKB-IT1
				ZNF8			MIR10A
				COPA			LMF1
				ARFGEF3			TMPRSS11E
				SLC26A3			DUSP2
				KIF11			LOC101928161
				INSC			C9orf50
				SYNC			GABRR2
				PTHLH			HUS1B
				MRAP2			PAX9
				PCDHB8			CTSW
				PHC3			NEFM
				UBL7-AS1			LOC403312
				TRMT112			NNAT
				PPP1R8			LINC02353
				RNF34			ABO
				GOLPH3			RAB14
				EXO5			GALNT5

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				COA6			CXCR2
				UBLCP1			NIPSNAP1
				CCT2			F9
				PDE6D			LIPE
				LRRC37A2			CNGB3
				TLL1			B4GALT1
				ZNF117			MPPED1
				DCAF12			GLYCTK-AS1
				CLK2			STAT4
				PPP6R1			ESYT3
				TNFSF15			PWRN2
				ZNF692			FAT2
				SH3GLB1			GSN-AS1
				MRPL48			LINC00958
				KIF18B			CCDC186
				XRCC6			LOC101927770
				UR11			CCM2
				KCTD18			LRRC4
				DHDDS			FANCD2OS
				LARS			ETS2
				BCL9			FCRL3
				ANKRD28			LOC102724030
				GRK3			FGB
				SNRK-AS1			DEGS2
				CDK2AP2			EPHA5
				TRAF3			ACTL9
				HDCC3			OVGP1
				SND1			FOLR1
				KNSTRN			C3orf20
				BCAP31			ARL4C
				SLC25A44			MAL
				PP7080			LINC01356
				WDR75			PRRG4
				TEX261			AQP4
				CHD6			BAG1
				ZSCAN26			SLC47A1
				ZFAND4			DCUN1D3
				LOC100272217			TBXA2R
				EFCAB7			DMPK
				GDI1			SLC7A14
				ZNF81			MCHR2-AS1
				ZMYND8			LOC100289518
				SNRPA			ITGA8
				PDXK			KRTAP17-1
				PIH1D1			TRPC7
				PTGES3			GRIK4
				EFTUD2			IDNK
				TAP1			TRG-AS1
				ZNF670			LOC101927143
				HSPB11			TMPRSS6
				CS			TP53INP2
				ZNF318			ANTXR2
				MED10			COL4A3
				PRDX1			SLC6A18
				MIR1244-3			LOC100286922
				FAM135A			MYO10
				NACC2			OR10D1P
				ZNF382			OLFM1
				NDUF6AF6			LOC79999
				STRIP2			IL1RL1
				COX17			PDZD9
				EXOSC10			LINC00917
				INTS8			CYP4F3
				FAM24B			ALDH1A2
				ERMP1			SHCBP1L
				GTPBP3			GABRG1
				THAP8			LOC283140
				ARHGAP33			ZNF366
				TCF12			EGR1
				HACE1			CCL17
				SNRPF			KHK
				BCL2L2			ESRRG
				LOC102724156			CNGA1
				EMG1			EFNB3

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				SNU13			ZNF540
				WDR5B			OTX1
				MERTK			RDH5
				ARMC8			LINC01214
				MYNN			GLP1R
				ZNF625			LINC00550
				RNF144A			TMEM8A
				KIFC1			LRRRC25
				DHRS13			GRHL2
				EMC3			FAM215A
				POC5			STPG3-AS1
				SMC1A			NLGN2
				DCLRE1B			SELE
				PRKCD			LOC101929004
				NDUFB4			CNR1
				GLB1L			PCDHA2
				PUS1			CST9
				SMYD5			NR2E1
				PEX1			LLGL1
				TUSC2			MS4A6A
				LDAH			LINC01565
				TMEM74			KLF6
				TAPBP			FNDC11
				RBM19			ANXA9
				ENAH			THBD
				ZNF765			ABCD2
				MID1			SRR
				C3orf33			CYP4V2
				ATP2C1			SCNN1D
				RCC2			D21S2088E
				TMEM230			CLEC4C
				RASEF			LOC101928707
				RNF103			ZSCAN10
				MAMSTR			LINC00626
				DBF4			DCD
				TSHZ2			CD180
				POGK			BHLHE22
				MAPK9			FAAH
				PABPC3			IL17A
				ALG12			PVRIG
				RIPK2			MAP4K1
				CD58			ACCS
				TRIM37			LOC100130417
				IREB2			FNDC7
				PDCD7			CYP2A6
				EXOSC9			LOC101929524
				ZNF566			PITPNA
				PSMC6			LSMEM1
				ABCC4			SLC43A3
				PDRG1			BTBD16
				SSR3			PGLYRP2
				NAA16			SLC25A22
				STRADA			TRIM40
				MAGT1			SLC22A8
				FRG1HP			SEC14L3
				FTL			SLC22A1
				DYRK2			EPS8L1
				ARIH2			PLA1A
				USP54			CAMKK1
				RNF2			ANXA6
				PAGE2B			KCNJ9
				SLC25A21-AS1			SNORC
				PIK3C2A			CDADC1
				DNAJC7			EMID1
				RNASEH1-AS1			KIAA1217
				SMIM8			TSPYL2
				ASAP3			LOC101928185
				ZNF595			ENDOV
				POLA1			SMPD1
				PROSER1			LOC338694
				MRPS18A			TMEM132C
				TMPO			TMEM47
				ASPH			TBC1D2B
				CPA2			C2CD4B

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				FLOT2			TIGIT
				EARS2			DLG4
				SRP68			KRT17P5
				ARPC5			STOM
				CDKN2D			SLC13A2
				LOC100132356			GSN
				SYNGR2			EGR2
				NDUFS2			MED11
				UBR5			PLEKHG3
				LINC00894			GLB1L2
				PRPF4B			LINC02510
				NRBP1			LOC283335
				KDM1A			TCP11L1
				ILK			SPON1
				LEF1			SULT1A1
				PEAK1			PLA2G4A
				MRPS7			SH3GL3
				MAPK14			MAPRE3
				TOB1-AS1			MYCNOS
				LOC101929747			LOC101927314
				RNF113A			EXOC3L2
				NHP2			DCDC2B
				CLCN2			DBT
				SELENOH			INVS
				DPM3			LOC105374989
				TFPT			LOC102723661
				EIF2S3			RFX1
				AP4B1			LNP1
				VBP1			HPS3
				MOCS3			KCNK17
				PPHLN1			NGB
				RAPGEF1			LZTS1
				HSF2BP			CPN1
				ALG13			BRE-AS1
				STC1			GABRB2
				RPAP3			EDNRB
				ZBED5-AS1			CD27
				NAA20			PEX13
				TMEM8B			FAM229B
				CPSF3			MAN1C1
				TMEM14A			ADAMTS14
				EFNA1			HSPA6
				CWF19L1			RCVRN
				GPKOW			03-Mar
				YY1AP1			NT5DC4
				PAGE4			SHANK1
				RAB23			NLRP7
				ARPP19			CD226
				RIF1			PDK2
				ZNF516			PHC2
				GGPS1			STAT3
				LARP1			UBXN10
				MAP2K2			SLC38A2
				SRBD1			EP400P1
				CGGBP1			SVOP
				HIST1H2BB			FAM83E
				VIM			LINC01142
				SUMO3			MBD4
				UQCRB			VPS9D1
				ZEB1-AS1			GPR141
				MRFAP1L1			IL34
				TMEM209			MAD1L1
				HOXA10			AMPD1
				SDCBP2-AS1			NEK1
				ARHGEF3			DPYSL5
				EXOC8			C9orf41-AS1
				RHBDL3			INPP1
				CSNK1G2			DPEP3
				HLA-A			TSPAN16
				SUPT3H			ANKRD11
				SAMD1			PLPPR3
				EGLN1			DUSP1
				RWDD3			SEZ6L2
				PHF19			NFKBID

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				TTC5			ND4
				COX20			LINC00029
				CMC1			FAM155A-IT1
				DYDC2			BCAR1
				ATP6AP1			C5orf49
				ZNF518A			CDC42EP2
				NR1H2			LUZP4
				ARHGEF39			LINGO1-AS1
				ZDHHC12			PLD5
				DCAF1			LINC01924
				ANXA2R			FAM83C
				SLC25A29			GPRC5A
				SYNJ2			DPYS
				CAPG			ZDHHC19
				SLAMF8			GARNL3
				ROBO1			MRC2
				MPZL1			LINC00700
				ARSB			LOC105375875
				PARPBP			ARHGEF7-IT1
				RUVBL1			ACVR1C
				ADAM9			LOC101928797
				ZSCAN29			ABI3BP
				SPIN4			ATP1B2
				APAF1			LINC00561
				TMUB2			TICRR
				GPR176			NKX6-3
				UBA3			CHRM3-AS2
				HARBI1			GRHRP
				NOP16			CDK5R2
				MATN3			ZNF497
				IFNGR2			WAS
				LOC643201			SLC30A4
				NDUFA4			ODF2L
				ZNRD1ASP			CRYBG2
				ITPR1			TUB
				EIF5A2			PASD1
				CAP1			PCDHAC2
				TBC1D20			RUNDC3B
				CEP83			LRRC15
				PKP4			OR7C1
				DDAH2			NDFIP2
				VPS11			IFNA5
				STX7			TMEM75
				ATXN3			MINDY3
				TRIM27			CAMP
				SETD6			GRHL3
				RABGAP1			ADAMTSL2
				N6AMT1			ZSWIM6
				OXR1			ANKRD36BP2
				CHCHD1			CYP2A13
				RNF187			OGFRP1
				TGFBR1			SSTR3
				GBP2			TNS1
				TGM3			LOC105370549
				MTCH1			OVOL2
				NCK1-DT			C10orf95
				WDR4			SRGN
				SLIRP			MS4A15
				CDC26			PPP1R10
				C1orf52			KCNJ10
				CDC42			LOC101930028
				NAA10			CRYGN
				VPS33B			TMEM106A
				NPIPA1			SCGB3A1
				HEXB			ANG
				LRPPRC			WFDC13
				LOC440434			ACSL5
				NDUFAF7			LOC100132077
				DPH6			C1orf87
				TM4SF18			STYX
				SETD5			POM121L2
				EBF1			PRUNE2
				PPP1R16A			FAM30A
				TMEM169			SMAD4

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RRS1			AFM
				TNKS			HYPM
				SNX2			G0S2
				DUSP5P1			FCHSD2
				RBX1			THOP1
				ANKRD54			CCDC160
				TSNAX			ASB16
				C5orf34			PER3
				ATM			RIOK3
				PRRC2C			CACNA1F
				HIST1H3G			GCHFR
				PCID2			GRAMD4
				LTN1			PBOV1
				LINC00667			LINC00311
				TRMT13			SUN2
				GTF2H4			PRKAG2
				ARHGEF18			BRINP1
				BLOC1S3			AGXT2
				DAPK2			PRICKLE2-AS3
				DCAF7			CELF3
				CENPA			MUC4
				SUMF2			MST1
				TCTEX1D2			BCL2L13
				TMED5			LOC101926892
				MCAM			LINC02523
				PARP2			CCDC30
				RNFT2			IGFL2
				AQR			TMEM63B
				CDC47			ELMOD2
				MAP7D2			S100A8
				USP45			BPY2
				PPIB			C7
				ATP5MF			SHC3
				SFN			GLYCTK
				CCDC127			UROS
				HHIPL2			SIRPD
				CALY			LOC339874
				MTREX			MGMT
				IQCD			BUB1
				ATP5MC2			RNF138
				MDM1			MYLPF
				SMPX			AIF1
				SSUH2			CPEB1-AS1
				PYGO2			SLITRK6
				EIF3F			SEPT5-GP1BB
				CSE1L			LIX1
				ASRGL1			LINC01520
				EDEM2			F8
				LENG8			ACHE
				AATF			SLC28A1
				MCRIP1			ARHGAP23
				CDC20			LOC105370697
				C3orf80			EGR3
				E2F5			CTD-2194D22.4
				MRPL50			IFRD1
				C2orf76			MCL1
				SLC26A11			PRNP
				RCAN3			KIRREL3-AS3
				FTSJ3			SLC9B2
				ATG13			SHMT1
				OSGEPL1			LINC01165
				SLC35B3			LOC101928943
				LOC105373383			CASC23
				RRP1B			IL27
				SERPINB9P1			RSPH6A
				ZNF195			FOXA3
				PRPSAP1			CECR3
				NSUN5P1			LOC101928521
				TTC7A			KLK15
				RPL6			SRSF4
				MRPS26			ASGR1
				DNAJB6			TLR3
				CAPN10-DT			LINC01692
				DHX34			CPED1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				CAMK2N1			RAB17
				ATP6V0E2-AS1			LPAR2
				ZNF787			PRICKLE2
				UTP23			MTMR9
				H2AFZ			MCCC2
				PPT1			CARMIL3
				SLC35C2			CPT2
				COX4I2			IVD
				UBE2B			TRIM58
				PLK4			GLRA3
				KEAP1			LOC286083
				H2AFX			SPRED3
				RFC4			DMRTA2
				JAZF1			SORCS3-AS1
				GNB2			TMEM100
				RPL30			CLDN19
				PLOD3			UBAP1L
				KAT2A			RNF165
				SULT4A1			DNAH2
				CGDC130			CREBL2
				DRG1			TGDS
				SPCS1			BCAS4
				SRP19			ANP32C
				MFSD1			UBASH3A
				LRP10			ZNF429
				LEMD3			ZNF831
				KRII			LINC01588
				PUS7L			CA7
				PLEKHF2			ENTPD5
				CPQ			DGKK
				HOXD1			ACAP1
				DYNLRB1			LINC01312
				POLQ			CXCR5
				GTF3C2			KLRF1
				CNOT10			LINC01676
				DIMT1			C16orf74
				SPAG4			SMIM24
				MRPS30			TAS2R16
				ATL3			NPY5R
				MAP4K5			IRF4
				EXOSC8			BTBD6
				CHODL			SPATA42
				DLGAP1-AS2			TUBE1
				MIEF1			WDR31
				PLAA			RGS2
				ZNF184			LOC729224
				ORAOV1			LOC105370629
				GDPD1			DLL3
				PRR14			CNTN3
				ZNF267			FASLG
				ZBTB6			RTN4
				TSPAN5			PHRF1
				PABPC4L			DIRAS3
				PRRT3			GTPBP8
				ACTN2			ETNPPL
				SKA1			PSG9
				NUDT3			ASGR2
				LINC00266-1			PIK3R4
				ZRANB2			CD163
				TRIP13			SIGIRR
				NEB			DPT
				GABPA			LOC101927263
				ZNF260			PRKAR2B
				CAMK2G			LINC01771
				HMGB2			UBXN8
				FGF14			PGAM5
				PTBP1			FBXO21
				USP37			KREMEN2
				KIF3B			LINC01128
				SNX7			CCDC154
				ZNF335			SLC8A1-AS1
				HEATR1			PCDHA10
				GLMP			EPHA3
				PSME1			PRDX3

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				NAA35			MUC19
				VPS8			GPR65
				POLR2D			MCPH1-AS1
				H1FO			C19orf66
				TOR1B			KIF26A
				ARIH2OS			NPFF
				MVP			LINC00302
				MTX3			LATS2
				MRGPRX1			MIXL1
				ZMYM1			NOCT
				BCL7C			SKAP1
				HNRNPC			GADD45G
				ARHGEF40			LEAP2
				CCDC142			LURAP1
				LYPD1			APCDD1L-DT
				FXR1			DNMT3L
				MVB12B			PHACTR2-AS1
				CASP3			CMTM2
				ITGB3BP			FITM1
				ISY1			LINC01777
				ELOC			PCDH1
				YWHAB			TPRG1
				NNT-AS1			PMEL
				CNOT9			OCIAD2
				RNF213			CDK9
				CUL1			PLCG2
				LY6G5C			TERB2
				DHX9			SNX29P2
				TMEM67			ERP29
				NCKAP1			CDYL2
				WDR47			RNA45SN5
				KCTD20			HRH3
				TH2LCRR			TTR
				XPR1			CCR1
				PRPF40A			ITGA2B
				ACE			MAOB
				DALRD3			PTPRN2
				AGO1			PTGDS
				THAP2			MYOM2
				DTD1			LRRC55
				INTS11			RANBP3L
				EML2			NCS1
				DUSP11			LINC02443
				DDX19A			BST2
				P3H4			CYP1A2
				TMA16			CCNL1
				CREB3L2			DUSP6
				TIGD7			ADGRB3
				FOXP4			ELP5
				PTMA			TGFB3
				MOB3A			IGSF10
				WASHC4			ELK1
				GFM2			ALLC
				ZBTB37			KLF7
				NUDT2			MYO3A
				ARHGEF11			TCP10L
				UHRF1BP1			ZNF491
				IVNS1ABP			GPR183
				DUSP19			TCN1
				RGS5			LINC02081
				BTBD3			H1FNT
				DNAJC14			LILRB1
				PPP1R2			PYGL
				UBE2NL			LINC01831
				MRPL18			BEND2
				BBS2			GRIK1
				TUBA4A			TXK
				GRB10			B3GNT4
				EEF2			CHTF8
				LMAN2			LOC101928419
				CHCHD3			OPN5
				R3HCC1L			ID4
				P4HA2			SOX5
				RBM12			C11orf40

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RFWD3			DSCAM
				MOV10			TAS2R45
				H2AFJ			INA
				LRIF1			LOC729296
				EDIL3			PERM1
				LOC100505874			LOC101927138
				DFFA			OR7E14P
				SEMA5B			HIBCH
				SMC2			GAL3ST2
				ATP5F1E			EIF5
				PECAM1			PLA2G5
				PRPF4			UBL3
				DEDD			LOC101928446
				TMEM9			LOC100507336
				PTPN1			MTMR9LP
				PEX2			OOSP2
				MIR181A2HG			CD5L
				GON7			LPA
				IFITM3			COL4A4
				SLU7			LY75
				GPATCH1			C8B
				VPS37C			PNMA8B
				RCCD1			ANKFN1
				WDR11			LINC01869
				NT5C3A			DNMBP
				EZH1			APOBEC1
				UBE2S			SURF1
				SAP130			GRID1-AS1
				ANAPC11			ANKRD30BP3
				TMEM65			SPNS2
				NIFK			ZNF876P
				UBR5-AS1			SLITRK5
				WDR46			LOC101928307
				CD59			MYO15A
				EXOSC1			CD79A
				CAPZA1			GIMAP7
				GLRX3			SAMD14
				ARHGAP18			TEX35
				UVRAG			HCN2
				LINC00674			COLEC10
				ZNF512			MT4
				CHM			ITIH6
				EPB41L4A-AS1			TRAPPC8
				STX1A			GK3P
				SH3BP5L			DCUN1D1
				MRPL3			PLEKHN1
				POMP			SLC6A5
				B3GALNT1			GRIK5
				C17orf58			NAXD
				AHSA1			ATAD3C
				EAPP			CYP2C18
				TIMM9			LINC00920
				COX6B1			LINC00582
				MAPK6			LOC441204
				FRMD8			GSX1
				FAM198B			FGA
				USP31			NECTIN3
				SLC5A6			CALHM3
				PHBP19			SLC1A1
				UBE2R2			RPL3L
				LINC00528			FREM3
				TATDN2			PSAT1
				SDCBP			PTPN21
				NUCB2			PMP2
				CUL5			FOS
				SNX27			IFNG
				HACD3			SLC4A9
				MTA3			MYCBP2
				LOC100288570			PRR32
				NOL12			TGM6
				ANAPC2			C16orf82
				SNRPA1			RETN
				CERS5			SLC6A19
				MZF1-AS1			SLC12A1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				SFT2D3			COX18
				IL12RB2			NAT16
				CLEC14A			LINC01538
				SLX4			CYP27A1
				AIFM2			PAFAH2
				LOC101929279			NAV2-AS5
				PALB2			TUBB6
				YBEY			HTR6
				TIMM10			CAMK2A
				MED17			TMEM190
				POLR2K			RNF144B
				TPP1			LEMD1
				SASS6			LOC105378997
				HNRNPF			C11orf97
				LOC100130691			LOC101929718
				PABPC1L			AZGP1
				SNHG27			PAMR1
				BRAT1			FXD7
				STIL			CLU
				NME7			CCDC33
				OPRPN			EPHA6
				UBE2C			CXCL12
				NQO1			SLC43A1
				ZSCAN2			TMEM198B
				DHPS			ERVFRD-1
				SP1			LINC02328
				TOX4			ENDOD1
				MND1			C4orf17
				HSPA9			FCGR2C
				AXIN2			CCDC105
				DENND1B			SPACA4
				HCCS			STKLD1
				GTPBP4			TRAF4
				ZBTB1			C19orf12
				GTF2F1			LGII
				RPS15A			LOC101928861
				TAF1			IGLC1
				CXorf57			GPSM3
				GIN54			SLC20A1
				FAM173B			CX3CL1
				DEFB132			AJM1
				NDST2			ENTPD3-AS1
				CCDC18-AS1			GYPB
				PPME1			LDB2
				PIK3CA			C16orf89
				RBM42			JSRP1
				ATP6V1E2			EHD3
				CKLF			LOC100506175
				SLC9A6			SPTB
				C16orf91			WDR72
				HTT			UNC93A
				CYB5R1			KLRC3
				RUSC1			PGAP3
				TSR2			EFEMP2
				DAB2IP			A1BG
				NUP160			C21orf62
				TPGS2			DGAT2
				ZFC3H1			TNFRSF1B
				ERBB3			FAM69A
				USP21			LAMA5-AS1
				ZKSCAN8			LOC389906
				ATP6V1H			THNSL1
				ORMDL2			ISM2
				SERPINB1			HMGCL
				DHX57			CNGA4
				LINC01355			SNRPN
				ACSM1			CACNA1S
				ZNF766			GCFC2
				KIFC2			C7orf71
				TDG			ACAA1
				PLAG1			CPEB2-DT
				FIGNL1			LINC00838
				C7orf77			LINC00458
				APH1A			ANK1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PUS7			WNT2B
				XPO1			SRD5A3-AS1
				DCTPP1			NHLRC4
				ZNF300			SMU1
				WDR35			GJD2
				LATS1			SPATA20
				ZNF777			TMEM177
				BAZ2A			APCS
				HTATIP2			KRR1
				GRM5			TXNDC2
				RPS12			EPM2A
				MED1			C6orf10
				ATG4C			PC
				ZSCAN25			PAK5
				GPR34			PDZRN4
				TFAP2C			FAH
				ABCB10			MON2
				ING4			C19orf84
				DPH2			TNFRSF10B
				ID11			CDK5R1
				KCTD6			BEX1
				VPS28			LINC00957
				AP3M1			LINC00930
				ZNF71			ACAD10
				CEP76			SLC2A4
				RRM2			SMIM14
				MRE11			LOC100289473
				COG5			C1QB
				SLC4A1AP			IL21R-AS1
				COMMD10			ALKAL2
				COP88			LINC02153
				KLHL12			OTUD5
				CD63			SLC41A2
				NCBP2			LARP1B
				TOP2A			EDEM1
				ADAM1A			SPATA2L
				GADD45GIP1			NOS3
				FEN1			EP300-AS1
				MRPS23			OXER1
				LOC101926967			ADH1A
				SNX30			C21orf91
				SF3B1			AQP4-AS1
				EFNB2			MATN1
				MAGEA6			ANGPTL6
				IPO7			TUSC1
				LOH12CR2			CFTR
				CAV1			VSX1
				GNPDA2			ARMCX6
				TSG101			KCNA5
				NOB1			SLFN1
				STRBP			NFATC2
				HELLS			TREH
				GTF3C4			CD48
				ABHD3			NOMO2
				FANCI			FAM210A
				TMEM260			ARHGAP44
				IQSEC1			MLF2
				PATZ1			ACSF3
				RBM22			ALOX12B
				BAG2			SP3P
				PSMA7			BRINP2
				TTF1			TRBV27
				TUBG1			SLC12A5
				RETREG3			COX6B2
				RAD54L			GRASP-AS1
				PLAGL2			TMEM121
				MSI2			TEX26-AS1
				SPARCL1			LRRN3
				TMCC1			PTPRO
				COQ8A			CLEC12A
				ITGA9-AS1			MAP9
				SMG5			GPRASP1
				SNHG17			ACBD4
				PCDHB16			CD3G

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				FAM32A			CDKN1C
				NCAPD2			RHBDL2
				TMEM109			SIRT3
				SLC25A6			LOC101927870
				C1orf74			SPSB3
				FAM172A			TCERG1L
				DCP2			OR2L1P
				MRPL49			IL7R
				RPL18			MSRA
				PPM1L			FAM83F
				EXTL3-AS1			IFNA4
				POLR1D			TLR4
				GIN1			KIF13B
				LRRC37A3			RAB12
				PSMB5			PCDH9
				ANKRD29			ADAMTS13
				C1D			ITFG1
				USB1			CBLN3
				GPN1			C22orf34
				MXD3			ZNF517
				FAM185A			IYD
				UBE4B			ZMYND12
				OR51E1			SUFU
				TBX19			HMGCLL1
				DNTTIP1			NEUROG1
				CHD4			SOCS2
				FAM98C			EXTL1
				TRIM71			XKR6
				COMMD3			CYP2C8
				LINC01278			SPATA21
				RPS19			RARG
				TSEN34			LOC728730
				DUT			RANBP10
				KIF18A			MYO7A
				LY6H			C11orf24
				CRYZL2P			DOCK5
				TXNDC9			DENND1C
				MAP2			RBMS3
				KHSRP			LOC101928335
				SLC25A19			DSEL
				TNFRSF11A			CD1E
				FBL			ILVBL
				ZNF34			CST13P
				LOC100507053			NOX1
				CDC73			DPEP2
				RTP4			TDRP
				C19orf54			VN1R10P
				EIF3L			SMG6
				PMS2P5			FGL1
				DYNC111			FGFBP2
				06-Mar			TMEM213
				SERAC1			MIR205HG
				PPP4C			LCN6
				ANAPC5			IL33
				SDF2			TLR9
				DZIP3			LINC00028
				RIT1			AMN
				PKN1			DTHD1
				RHBDF2			GPR137
				AFMID			RNF212
				FBXW11			PPP1R16B
				TMEM201			TSSK1B
				ETAA1			HAAO
				AKT1S1			LOC101927531
				SURF6			MDN1
				PHF14			CLDN20
				S100A10			FGF3
				THOC6			TNFAIP2
				SAP30BP			SLC35A3
				WDR76			PENT
				RRP12			LINC01845
				BAZ1A			KLK10
				PRMT3			ADAD2
				SUPT20H			MYO1F

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				MEAF6			NIT2
				CXorf36			NOG
				MRS2			SERPINB10
				BCDIN3D			ST3GAL3
				ZFAND3			PPP2R2B
				NDUFB2-AS1			CHD5
				PPAT			SOWAHC
				HSPH1			ELF5
				CARD8-AS1			HOXB9
				FAM133A			SETD7
				DPP8			IL12A-AS1
				TMEM198			HOTS
				ZFP64			PARP3
				OTUD7B			ITGA9
				ACTB			ACSL6
				UBA2			DAOA
				TRMT12			MMP25
				IFI35			ULK2
				SLC39A3			CTD-3080P12.3
				DISP2			RADIL
				SUGP2			MAPK15
				C1orf226			ADIPOR2
				DDX51			AKT1
				MKRN3			LINC02099
				SLC30A5			ZNF462
				TUBG2			RGMB-AS1
				C3orf18			GBA3
				CYB5RL			UGP2
				LOC101928269			TEX13A
				C18orf25			RNF125
				UBQLN1			ECHDC2
				LIN37			SEC14L4
				MIR4307HG			ERVH-1
				PPP2R5D			CESSA
				WDR5			RP1L1
				CAP2			CRTAC1
				CCDC15			CCDC148-AS1
				PSMD1			HSD17B12
				SLC41A3			CCDC85A
				FBXO4			HEMK1
				C7orf31			LINC01069
				TMEM128			PGBD2
				MLH3			ERICH6
				FAM83D			CYP2B6
				CSNK1G3			AURKC
				IFNGR1			PHETA1
				SRFBP1			PITX3
				COPB1			MUC5AC
				MIR646HG			GRM4
				RNF219			HPX
				DHDH			KLK1
				PRELID1			GPM6B
				ANGEL2			LINC01514
				MRPL21			PIP5KL1
				DYDC1			ENC1
				MPP3			MAP2K1
				TGFBR2			KCNMB2
				CDC123			AIM2
				DEAF1			ANK3
				UBXN6			OR2F2
				CIZ1			TIMP2
				MARK4			PTP4A1
				METTL4			CLRN3
				LOC100505549			MMP25-AS1
				PGC			ARSE
				CLEC16A			GP5
				IER3IP1			LINC02112
				ZNF607			ATP13A4-AS1
				HERC4			FCRLA
				RASAL2			ARRDC1
				RPL41			OR11A1
				DRAP1			MT1H
				RGP1			LOC101928343
				SLC38A1			COL6A1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				TOMM40L			FOXD1
				NFKBIE			LOC100127938
				PHF20L1			STMN4
				MCM3AP			TMEM141
				RAB11A			AMT
				HLA-B			ANKRD44-IT1
				ATP5F1B			IL11
				PTBP2			TDO2
				WSB2			FOXD4
				GBAP1			HSD11B1
				ZNF431			MMRN1
				CACYBP			LOC284865
				GPD2			SV2C
				RBM8A			TRBC1
				CDV3			LOC100507477
				ZFR			LOC101928937
				GALNT11			DDR2
				SCUBE2			LOC101928817
				CHAF1B			LINC01616
				MFSD4B			FBXL18
				QSER1			ZNF662
				FLOT1			IL20RB
				LOC400684			ADAM22
				PIGO			FAM209B
				HNRNPLL			LINC02582
				NRCAM			F3
				FABP4			CFP
				SLC35E3			DCTD
				LYRM4			NR1I2
				CSRP2			ALDH3B1
				CANX			THSD4
				HIPK2			CES4A
				DESI2			VTI1B
				ZMIZ1			EFCAB1
				DAP			APOA1
				SHARPIN			LRRRC37A7P
				TMEM44-AS1			PRICKLE1
				LINC00298			C10orf82
				ANKIB1			TPSD1
				MCM6			INHBA-AS1
				TMEM150A			CRYBB2
				SMA4			LARS2
				MFSD13A			SRSF5
				FRZB			SLC25A38
				NUTM2A-AS1			FTCD
				ZC3H10			GNGT2
				PABPC1			SIGLEC7
				LOC646588			GPC6
				CUEDC1			SNED1
				USP22			LPAR1
				LYSMD1			FOXD3-AS1
				TMX2			DLX1
				VPS52			WNT9B
				GNPAT			TTLL10
				RP9P			TOE1
				MYPOP			RELN
				RAP2C-AS1			ANKRD55
				E2F6			MAMDC2
				TMEM126B			ACOX2
				ZFH3			ATCAY
				CTPS2			ADGRF4
				EFNA3			TFPI2
				SCRIB			LHX2
				RSRC2			NBAT1
				NES			TMEM132D-AS2
				FZD6			PDHB
				EGLN3			AGMAT
				GUSBP2			JUN
				FBXO45			CSF1R
				SLC25A12			MYL2
				CUX1			PTH1R
				ERCC6L			ADAMTS5
				PON2			RBP1
				ZNF77			ASB12

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				UNC119			ADD3-AS1
				SHISA2			ADAMTSL3
				EIF3K			PHYHD1
				ANKRD27			CRISPLD2
				CDC42SE2			LOC102723701
				MALAT1			AOAH
				RRAGD			DMAC1
				EIF2S2			TRIM15
				CKAP5			CA6
				CPSF4			LINC00293
				UCHL5			SLC26A4-AS1
				SMIM15			ESPN
				ULK3			LOC101929180
				WDR86			LOC100268168
				POP5			AR
				SPDYE2			PAM16
				LINC02175			LEXM
				QRSL1			GATM
				CNPPD1			SESN2
				LINC00880			PLXDC1
				CARF			RASA3
				GTF3C6			OVOL1-AS1
				SREK1			LOC101928324
				VOPP1			MPG
				GTF2IRD1			ITPRIP
				CCDC22			SERPINB12
				SNX24			AMELY
				RARS			LINC01785
				MORC2			SCG5
				ZNF19			LINC01180
				STC2			LINC01398
				PGLS			C2orf16
				PIGW			SYTL3
				ZFP69			SCGB3A2
				BUD23			IQCC
				OAZ1			HEYL
				DSN1			LINC00687
				SGCE			ATP6V1B1
				YIPF5			STUM
				RLIM			CNTFR-AS1
				DTWD1			ATPAF2
				STRN4			PTPN13
				KITLG			PNPO
				HDGF			SFRP1
				LCN2			PDYN
				SUMO4			PRKCQ-AS1
				AKR1C3			LOC283665
				ARID4B			DAPL1
				BMS1P20			SUOX
				GMDS			PINX1
				SPARC			P3H3
				CBX5			LOC100652768
				BOLA1			ARHGAP22
				PPP2R5E			TNFRSF10D
				ASB7			SSTR4
				TTC9C			FOSL1
				SPATC1L			TTC38
				MAP4K4			ALDH9A1
				LOC100506100			ADD2
				ZNF37A			ICAM5
				PLEKHM2			PAPOLB
				FAM208A			CYP3A4
				FICD			HYALP1
				STX16			A2MP1
				DLAT			SLC27A5
				CASTOR3			CLIC6
				CDC5L			ACSM2B
				LMNA			PRODH2
				TBCD			LINC00593
				IGIP			PYDC1
				TMEM119			NPTXR
				CASQ2			ATMIN
				CRIP3			LINC01568
				TATDN1			PINK1-AS

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				KPNB1			TTC7B
				PEG10			SCARNA17
				KHDRBS1			SLC51A
				BRD3OS			CCDC189
				ZNF12			POU5F1B
				DCTN2			C6
				CTHRC1			TMEM270
				UHRF1			SLC16A10
				HIP1			CDK10
				DNAJC24			LINC02520
				CDKN2A			OVOL3
				SGO2			CAMK2N2
				OLA1			ELAVL3
				FAM120B			HLX
				RFX7			PTGIS
				RECQL4			LINC00470
				MFHAS1			CEACAM3
				CSRNP2			PLCE1-AS2
				DPAGT1			LINC00112
				PPA1			CDX1
				RASGRF2			LINC00310
				MEX3C			FBLN5
				MAGED2			TINCR
				SSBP1			NADK2
				KPNA6			SGPP1
				CASP2			CNOT6L
				SUPT7L			AMZ1
				ZNF341			HOXB-AS3
				STAG3L4			LOC101929529
				EOGT			WDR63
				SHKBP1			TP53TG5
				ATAD5			APBA1
				NOTCH3			KCNK16
				STK38			CIPC
				TMEM101			PINK1
				NF2			PYROXD2
				QTRT2			OR4D1
				KRBOX4			MUM1L1
				FBXO32			CNTNAP1
				MTMR3			ZNF684
				HIST1H3F			APOL2
				TRIM25			CNBP
				CRKL			SLC4A1
				NUP62			PRSS33
				ANP32B			PMPCA
				AP4E1			FYB2
				HNRNPL			AHDC1
				CDKN3			KLHL2
				TMEM168			MPL
				GAD1			C9orf78
				ZNF133			TMEM151A
				E2F3			CRTAM
				DHX36			ADAM12
				RPL26L1			ACP4
				TIGD5			HSD17B10
				NUDCD1			SLC52A1
				PHTF2			HSD17B2
				CCDC112			FAM214A
				CHCHD4			CYP39A1
				CUTA			C1RL
				APPL1			GJD3
				WAC			TECTA
				NDC1			HMGCS2
				WHRN			TLN1
				PCGF1			ID2B
				ECD			MITF
				PPP4R4			LILRB2
				TMF1			LINC01467
				CDKAL1			TPRG1L
				MTMR11			GZMM
				IDH3B			C18orf12
				RMI2			LY6E-DT
				RPS6KC1			STK32C
				TDP2			PADI1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				STXBP3			HRG
				EIF3G			CLUH
				GOLT1B			PROP1
				NEK3			PON3
				TMED4			LOC101927098
				NPC1			LOC101928516
				MIB1			NDUFS1
				ATG14			IZUMO4
				ZNF600			RPPH1
				TRAF3IP1			CCDC88B
				SMARCE1			SECLP
				SLC18B1			TCL6
				VRK1			RPL34-AS1
				B3GAT3			LINC01523
				ZNF678			AATK
				LRP11			C16orf54
				URM1			SLC16A14
				LRIG2			CHRM5
				TMEM106B			FXVD6
				SKA2			ANKS4B
				USP1			GOT1
				RNF44			UNC5A
				CENPM			RCL1
				PRUNE1			B3GAT1
				LINC01521			PCOLCE
				IL7			CSF3R
				ZNF420			LAX1
				BTG3			OXT
				RBL1			NTRK3-AS1
				PAK2			LINC00705
				LOC730101			IRF5
				TCEAL1			LIMS2
				PRKAG1			PAPSS2
				CENPF			BVES-AS1
				SLC25A43			PIK3R5
				SMAD5			PRRX2-AS1
				INCENP			LOC728196
				GARS			LOC100507562
				WASF2			TENM4
				IGF2BP1			AGBL4
				ABHD16A			INTS6
				C12orf73			CCDC106
				MDM4			IGH
				ZNRF1			A1CF
				C2CD4A			TOP1P2
				GNL2			ASB13
				PFDN2			KCNA1
				ZNF200			HSPA1L
				PRR3			LINC02239
				ATRNL			LYPD4
				DPCD			CLN5
				PUM1			IFNL1
				NDUFB9			LOC150051
				CCDC88A			LOC100506388
				PDE12			PPP3CA
				TRIM50			LOC101927668
				KCTD1			SLC1A7
				BIRC3			DLX2
				ZNHIT6			LOC101928326
				SPOCK1			DDB2
				BORCS8			LINC00208
				CDC48			WNT8B
				WDSUB1			GHR
				H2AFY			CFAP206
				RXR8			SPATA1
				ANKRD45			CLEC1B
				RAB2A			MKNK1
				ACTN4			CLEC4E
				PLCE1			HTR7
				CEP250			SERPINB9
				DLG1			RIPK4
				KCNJ2			MIR302B
				GSKIP			ASB10
				VPS33A			MIB2

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PIGX			MS4A2
				TFIP11			LAIR1
				GAPDHS			CCDC57
				POLR2G			IL17RC
				IFT52			GUCY1A1
				UTP20			LMAN1L
				YTHDF3-AS1			INE1
				TACC2			GATA6
				MMGT1			PF4
				TKT			CABP1
				BYSL			ALDH2
				WASF1			AIRE
				HSPB1			ZNF484
				TESMIN			LMOD3
				ANKRD36B			C3
				RNF38			SRSF6
				HSD17B1			LINC01410
				ZNF785			QDPR
				U2SURP			FOXA2
				GLTP			MAPK12
				HERPUD2			POLR1E
				SLC7A6			INSRR
				CSPG4			FRRS1
				ZNF572			DMRT3
				G3BP1			KRTAP19-1
				NUP155			DGLUCY
				GAS5			OTUD4
				POLK			ATOH8
				PAK1			LINC02502
				AMZ2			NPW
				MRPL10			LRIT1
				ATP13A1			LINC02499
				TPX2			SLC8B1
				GNAL			RBFOX1
				LOC101929147			SERPING1
				BTN2A1			FAM167B
				PAIP1			ADI1
				C15orf48			ATP6
				IGF2BP3			SCP2
				TAF9B			P4HA3
				FNBP1L			LRRC4C
				IMP4			RWDD4
				DHX35			ABHD2
				SH3BP4			ORAI3
				ZSCAN9			MAFK
				SLC33A1			QPRT
				ADCK1			LINC00837
				TRIM33			SBNO2
				G2E3			MYADML2
				TMCC3			TRIM29
				ARRDC2			MPP4
				ARL2			ERLIN2
				CD2BP2			SLC22A6
				PAPOLA			PDZRN3
				RAB3IP			TREML5P
				LINC00665			PCK2
				BAK1			DEFB119
				MRPL45			ADRA2A
				COX6C			DHFR2
				SPECC1L			BARX2
				NSMCE2			PEX11G
				TTC37			DAO
				TET3			DNAJB8-AS1
				HIST1H4E			LOC101927479
				SCAMP1-AS1			SLC17A3
				NUDT17			ZNF24
				TMEM39A			MICU1
				CASTOR2			ZZEF1
				MIR4435-2HG			LDHB
				RAB40B			PTMS
				RP55			CRYBA4
				MRPL38			CSPG4P1Y
				PIKFYVE			MRGPRF
				PI4KB			HVCN1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				ANP32E			HHLA2
				YEATS4			GMFG
				MTMR1			BDH2
				HOXA13			PENK
				NOC4L			FGF8
				MNS1			SMAD9
				DKK2			SLAMF1
				POLR3K			MT3
				ZNF182			RGL1
				LOC643733			LRRK2
				RHOT1			PHLDA1
				PUF60			NKAIN3
				DARS			LOC100129175
				ELOVL5			FGF6
				SHC1			CNTFR
				B4GALNT1			ZNF395
				ARL4A			PPEF2
				TANGO2			HIST1H2BL
				ARHGAP21			RASSF5
				IRX5			EPX
				SAAL1			LINC00330
				DAD1			ATAD3B
				HERC2			IKZF3
				RIOK1			ENDOG
				HOOK3			PRINS
				GINS1			FAM47B
				ITM2B			EZR
				BAHCC1			SLC38A4
				STK26			FGFR3
				BSN			PALM2
				CLCC1			IL5
				ACTR10			ADGRG5
				NASP			CLSTN2
				SMO			TSPEAR-AS2
				ACSL3			HINT3
				UTRN			LG14
				PALLD			NACAD
				SDAD1			PTGES
				RPL35			POU6F1
				IMPDH2			C20orf78
				ENOX2			RGPD5
				COPS9			FENDRR
				ZIC2			LINC02026
				CLTA			GPR171
				SMC3			CD300A
				ZNF702P			VTCN1
				PDIA3			LINC00572
				OGDH			AKNA
				LINC01097			PKHD1
				CBX3P2			01-Sep
				NT5M			CRP
				TMCO3			NEBL
				ZCRB1			FAM71E2
				TAF5			RARB
				ANLN			PLA2R1
				BIRC5			ULBP3
				CHRNA5			LOC100240728
				ZNF529			PNOC
				GNAS			STK40
				OXL1D1			HLF
				KATNB1			POM121L10P
				FTH1P5			ADAMTS2
				ATP5MC1			LINC01304
				MRPL52			TRPV5
				FITM2			IDI2
				SPIRE2			COLEC11
				TMEM250			HOXD13
				CCDC124			SLAIN1
				BMT2			CDY1
				BCLAF1			SPANXA2-OT1
				GOLGA3			CARS
				CDKL3			LINC00943
				BBS7			MYH2
				MGAT4B			NAALADL2

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RTF1			GTSF1L
				GLE1			MGST1
				KNTC1			FXN
				LOC101929552			SRD5A2
				EXOSC2			ARHGEF38
				RING1			LINC01704
				MYL12A			COLCA1
				NPC2			KCNJ13
				LAMTOR2			RABEP2
				YTHDF1			AKR7A3
				GTF3C3			IGLL1
				RBPJ			IL5RA
				LRRC8D			CPAMD8
				ZNF280C			RPP14
				DNAJC5			LOC100506731
				MSH6			IGLV1-44
				HECTD2			PBX1
				IPO4			PXMP2
				EMP2			ZNF425
				IP6K1			DHFR
				TRIM41			LOC101928035
				PIN1			DKFZP434K028
				SLCO2A1			LOC100131496
				POLE3			RSPO2
				FRMD6-AS1			RBM38
				TMEM98			PHACTR1
				C1orf216			MLIP
				PTK2			TPMT
				ULK4			GPR132
				BTN3A1			VPS13A-AS1
				USP3-AS1			RARA-AS1
				THAP12			IQSEC2
				NDUFA8			PLXNB3
				LAMP3			SORCS2
				FABP5			HEXIM1
				ZNF25			MEGF10
				SORT1			SULT1A2
				LLGL2			MYOD1
				FAM98B			ZNF747
				YWHAQ			GNAO1
				USP7			ECE1
				ZSCAN16			TEX13B
				YME1L1			HCK
				HNRNPR			LIPI
				MCU			OR5K1
				PCBP4			GABBR1
				TMEM120B			PSMD6-AS2
				RPLP1			NIPAL4
				SDCBPP2			TMEM25
				GHET1			BMP6
				KL			PPP1R1B
				ALCAM			LOC101928700
				MZT1			NPPA
				TRAM1			TIAF1
				FAM162B			PPL
				RACGAP1			LOC101928519
				ZNF605			LOC283038
				PSMD3			RRAD
				NUP37			FMN1
				RHEB			TRIM64EP
				OTUD6B			KIAA1656
				ZNF41			LCN1
				FAM213B			LINC01342
				NPM1			RPE65
				BCAM			MFSD4A
				TSR3			SNAI1
				TMEM117			SPCS3
				GUCY2C			TP53I13
				DNMT3B			CLDN9
				ABRAXAS2			MTHFD1
				DNAH12			SLC25A18
				TASPI			SLC17A9
				EDRF1			IGHD
				NIPBL			A2M-AS1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PPP2R5A			ZFPM2
				CCT8			C17orf100
				POGZ			ADRB1
				HMGH4			CEBPD
				LOC401261			G6PC2
				EIF3M			BCKDK
				RAD18			CSRP1
				IRF3			PFKFB1
				PIP4K2B			ZFP36
				MRPS12			TMEM170A
				TAF10			CMYA5
				CRIP1			SVEP1
				MAPRE1			TNF
				NDUFA2			ZNF417
				TRIP12			NTM
				ZMAT5			LOC100134040
				KCNE3			GDF2
				SENP7			DIXDC1
				ATG10			PCBP3
				APPPB2			BFSF2
				KIAA0355			LINC02325
				FAAP24			LOC400940
				KDM5A			GRM6
				USP19			NGFR
				SUV39H2			KLHL10
				TMEM87B			ATP8B4
				AFAP1L1			LOC100506289
				TMEM14C			CRYBB3
				SEC11C			ANO9
				ATF1			EDAR
				ZBTB18			HAGH
				MIR548XHG			LOC101927839
				FRY-AS1			IL1A
				HES7			TMEM179
				ARIH1			LOC101926963
				POLDIP3			FBL1
				RPL32			CACNA1H
				CFAP298			FYN
				C12orf4			CNDP2
				TP73-AS1			LINC00636
				MOB4			LINC00471
				DHX16			CAV3
				ATP5PD			PMS2P4
				LEMD2			CYP2B7P
				NBR1			BVES
				MIS18BP1			AKR1C4
				HPS4			DUSP14
				KIF2A			PAX1
				OCRL			RIMBP2
				ZCCHC9			DNAJC16
				ARL6IP6			PRMT8
				GLA			LINC00459
				BOD1L2			SELP
				DIDO1			RAB9B
				ZNF320			LOC339260
				CEL			CFAP43
				NGDN			SOX10
				IMMT			UBALD1
				CBFA2T2			TBX18-AS1
				CNOT6			FGF14-AS2
				DHX15			DCLK2
				FIRRE			CACFD1
				SAC3D1			SIGLEC16
				DRAM2			TMIGD2
				PIGP			LINC00408
				AGGF1			LOC101928505
				ARPC3			UCA1
				DPF2			DSE
				BRD8			DPP7
				TMED9			NFKBIZ
				WDR12			SERTAD1
				GABRQ			HAND2
				APOBEC3B			NSMF
				MED12			ROPN1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				NR2C2			TMPRSS13
				AURKA			SENP8
				AGTRAP			TAC3
				ZNF432			NKIRAS1
				TBC1D9B			KRTAP1-5
				SPG11			TEX9
				NOC3L			PANK1
				AP3B1			LINC02535
				C11orf68			LINC00842
				FUBP1			HS3ST6
				KIAA0586			DGCR5
				COP1			SFTPD
				FOCAD			MIP
				ANXA2P2			F2
				SMPD2			FUOM
				STMP1			LINC02256
				LINC00938			HERC2P7
				UBL7			BTNL3
				MTR			C19orf47
				ASH1L			RGS8
				PPP1R12A			TRABD2B
				VAMP4			TAS2R7
				ZNF7			MYL10
				BCAP29			PTGS2
				ATP1A1			C1QTNF7
				ALYREF			CCDC90B
				ZNF672			SPIDR
				TAB1			SLC25A34
				RGSL1			SLC7A4
				UBQLN2			REXO1
				YWHAZ			MUC3B
				PRRX1			SSC5D
				FAM83H			CTXND1
				ZNF805			RASAL3
				MITD1			LOC284379
				TRAF2			LOC100506016
				SNN			NAV2
				C6orf62			WNT9A
				FAM189B			ANKRD17
				AURKB			ADH1C
				FLJ46875			EFCAB5
				PRPF39			REPS2
				YIPF6			HAS2
				FAM71F1			RNF150
				CLTCL1			CYP2C9
				HPF1			ATP2B1-AS1
				BMS1P2			CST11
				NUAK1			LINC00174
				ALG6			KRT83
				LSM3			CYP2A7
				MOGS			C11orf44
				ZFP41			CA5A
				TIPIN			TRIM35
				MAP3K7CL			PIK3C2G
				SSRP1			SMCO4
				ASXL2			MSR1
				ZNF891			CCL4
				NCOA3			FAM122A
				SLC16A1-AS1			ARMH4
				CCDC6			LAMC3
				RASSF4			NPY1R
				DEF8			UGT2A3
				CHAF1A			ESR1
				PLA2G6			GCNT2
				CCDC113			LRRC19
				PIEZO2			SLCO1B1
				FTH1			GLOD4
				KCTD10			C20orf141
				TOR1AIP1			PRF1
				YWHAH			LST1
				PAFAH1B3			ACE2
				NPRL2			LOC101928251
				GRWD1			FAM186B
				MOSPD1			TPPP3

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				BOD1			LINC01339
				POC1A			SEL1L2
				UMPS			PLCXD3
				CCDC77			FMOD
				RAD1			FAM107B
				CYHR1			DENND2A
				C12orf65			PIM3
				NFRKB			MXRA5
				DDX39A			CLCA3P
				FANCA			GRM1
				REXO5			BPIFB6
				ASAP1			EPHB3
				PDSS1			RITA1
				SMG8			TRPC4
				C1orf198			GEMIN4
				HNRNPA0			ROPN1L
				MEIS1			RAMP3
				PCBP1			TSPYL5
				FAM114A2			PRSS27
				ZGRF1			ITGB8
				MAGEC1			GAP43
				AMMECR1			LINC01799
				NEDD4L			GNG2
				TTC30B			TNFRSF10C
				BRCC3			PCDH11X
				ERCC1			TMC6
				BEX2			DMGDH
				YPEL5			CAND2
				HARS			RIMS1
				AGO2			RCN1
				TRIL			HIPK3
				LRRC42			DRP2
				TMEM79			LOC101927499
				GTF3C5			TPD52L1
				ITGB1			PDZD7
				DSTYK			CRAT
				AP4M1			RAB25
				PSMC4			SLC19A1
				COL5A2			ABRACL
				LEF1-AS1			OR10H1
				SNX13			MFAP3L
				NOP10			PIK3CD
				ZNF271P			DERL2
				NAIP			MAIP1
				PSMD8			L3MBTL4
				XRCC4			TINAGL1
				RARS2			ABHD18
				RABGEF1			SLC31A2
				EPS8L3			GPR182
				THY1			PHF24
				CYB5R4			ZIC3
				NAPB			CWH43
				FNTB			EOMES
				TRAPPC2			FHAD1
				SLC50A1			LPAL2
				C5orf46			MPDU1
				C1GALT1C1			UBL4B
				FHIT			SLC5A3
				PPOX			TRIM51
				OSBPL3			LINC00382
				CREB3			LINC01103
				GABPB1-AS1			ADRA1D
				TCEANC			LINC00892
				ABHD17A			SCART1
				RAD54B			FRMD4A
				ATG7			ASB1
				HRCT1			KRT31
				LRR1			BCL11B
				MED25			FOXE3
				MSANTD3			CERS3
				BARD1			ART4
				MCFD2			ZC3H12C
				OLMALINC			EVX1
				EPS15			NLGN3

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				ZNF627			PRM1
				EIF2B2			ACAA2
				SPDL1			LOC101929662
				GNS			GPR18
				ASPSCR1			TMEM53
				PHOSPHO2			FCMR
				WIPI2			LOC101928626
				RANBP1			SLC9A3R2
				CBX1			WWOX
				PEX26			RSPH3
				CSNK2B			PFN4
				ARFGEF2			KLF9
				C17orf80			KIF25-AS1
				NELFCD			TPST2
				CTNNB1			FIGN
				COX7B			MRC1
				TMEM69			KCNIP1
				TMEM185B			MORN5
				ZNF362			EEF1AKMT1
				DND1			PPP1R3F
				ZNF781			IL13
				C6orf48			DAPK1-IT1
				CCNK			CD86
				EPHX4			GYG2
				DNMT3A			LINC00672
				POTEKP			LINC02052
				CD200			MIATNB
				ORMDL1			RAB4B
				WNK4			TEX51
				ITGA6			ZBTB4
				ZNF468			HUNK
				NKAP			POU2F2
				THAP5			B4GALT4
				DKK4			LOC375196
				USP11			PK4
				LOC105370475			TRMT11
				IMPA2			BEND4
				PRKDC			NNMT
				ZCCHC10			LINC00824
				PDCD6IP			SNX29
				NOL11			B9D2
				EXOSC3			SAMD5
				PSMD2			ZNF90
				ZFP90			IGFBP5
				ZNF740			RBPJL
				CHTF18			NRTN
				AP2B1			LOC389895
				SLC30A7			LINC02483
				ATXN2			MEGF6
				RRAS			TNFSF13
				SMCHD1			CARD16
				POP7			HABP2
				UBE2Q2			BMP10
				ARHGAP12			IRF2BPL
				ZFPL1			LOC100294362
				IK			FBXO15
				ZNF565			NRROS
				KCNN3			CREM
				NACA			ATP2A3
				CCNDBP1			PTGER4
				LOC389834			WFDC9
				SCCPDH			KCNQ1
				BCS1L			PROCA1
				KDM7A-DT			WEE1
				NUDCD2			ADGRF2
				CDK4			HSD17B7P2
				SPSB2			RGS1
				PRMT1			LOC101929488
				TEX10			PRDM1
				DNA2			LINC01088
				TNFRSF19			TEAD4
				MRPS9			FGD2
				DPY19L1P1			SLC26A6
				CEBPZ			C14orf180

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				CLN6			MS4A3
				DMXL1			FGFBP1
				SH2D3C			BNC1
				GPRC5D-AS1			LINGO3
				PTPN14			AJAP1
				RBM3			CACNA2D2
				SNRPG			TBATA
				DMTF1			SLC25A42
				SCFD1			KIAA1109
				IBA57			PTPRC
				ACOT9			MYO1E
				FAM53A			RASSF8-AS1
				CNTN5			MIPEP
				LRRC45			CD14
				ZNF514			UCHL3
				ZKSCAN1			HACD1
				ADCK2			LRFN4
				WDCP			EI24
				SAYS1			CNTROB
				THEM4			LINC01098
				FRS3			RWDD2B
				HCG27			CARHSP1
				ZNF354A			PLPP4
				NTPCR			LOC100506142
				SELENOS			GREM2
				GXYLT2			ARHGAP20
				UBE2K			NR3C2
				SF3B2			LOC100507351
				XYLT2			SNORA37
				FLYWCH2			MYBL1
				XPOT			SLA2
				MDH2			MTUS2
				TXNL4A			HOXB1
				FGFR4			SHC2
				LIMS1			INPP5K
				LINC01549			BLNK
				ZWINT			ACOT6
				PAK1IP1			COL9A3
				SLC7A11			IL19
				SHISA8			ASB11
				UXT			LINC01516
				PPM1E			OR8G1
				ZNF780B			LOC339468
				DOCK4			PHGR1
				APEX1			FAM238C
				CEP68			MDGA1
				ENOPH1			MCCC1
				MRPL11			WNT1
				ARPC1A			WDFC1
				PSEN2			ZC4H2
				WASHC2C			LINC00652
				SPATA2			HEBP1
				RUFY1			LUM
				UBE2L3			C1S
				ATP6V1E1			TTC19
				TXNDC12			UBASH3B
				NAA15			HMOX1
				C3orf70			LOC729870
				ZNF223			GGACT
				ORC5			CALML5
				KIAA1841			INS
				MEP1A			TMEM102
				DAG1			FLT1
				EGFEM1P			SERPIN8
				GTSE1			SLC25A2
				WDR86-AS1			SHISAL2A
				RPS24			TRAV8-3
				TTC27			LOC100129935
				MRPL9			ALOXE3
				RUNDC1			GAREM1
				RPL24			SPIN2A
				MAVS			BMS1P1
				NUF2			NOL4
				FAM120AOS			FCGRT

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PWWP2A			CCS
				ABT1			PRKCZ
				HIST1H2BE			LOC101929902
				RCC1			IL20
				FAM91A1			CYP3A7-CYP3A51P
				CKMT2-AS1			TSPAN12
				PARS2			ASL
				BROX			PLD2
				PIP5K1C			METTTL4
				INTS12			GATA3
				CAHM			PALM
				GNA13			RSPH14
				FAM228B			PM20D1
				TSPAN14			TBC1D22A-AS1
				NAA40			KLHDC7A
				CHD1L			CDC14B
				MSTO1			SYNE3
				CLIC1			KCTD4
				CNKSR2			ANGPTL4
				ELL3			HCG22
				NUFIP1			PLCH1
				ZC2HC1A			ACOT13
				ZNF74			NAMPT
				LINC01448			UROCI
				FLVCR1-DT			ELOA
				STAT1			HS3ST3B1
				HYAL2			FAAH2
				PTTG1			LOC100506446
				TMEM62			SFXN1
				COL8A1			FAM102A
				KIAA0556			MMD2
				POLD4			KLHL1
				ERGIC3			OR51B4
				MRFAP1			CRH
				CREB3L4			TEDDM1
				C8orf59			AMFR
				CASP8AP2			TTC36
				MMP12			FNIP2
				TARBP1			CORT
				COLEC12			CTRC
				TNFRSF25			GJD4
				CDCA5			ISLR
				PEX11B			HOXA2
				LIX1L			TSKS
				DLL4			FYB1
				UBE2T			TULP1
				SLC2A1			JAML
				CHMP4C			LOC220077
				GHDC			GNG3
				RECQL5			C1orf50
				SSR4			RCHY1
				SPAST			VPREB1
				ZBTB24			USP46
				TEPSIN			LINC02352
				CCDC47			PSD
				SMAP1			DNAJC5G
				HAGLR			LILRB3
				ZNF862			TCEAL7
				BBX			SPI1
				PPP1CA			NKAIN4
				COMMD8			ATG2A
				NAP1L1			LINC01241
				IGSF21			HOXB4
				ECT2			RPGRI1L
				DOCK6			GPRC5D
				SLC38A6			KIF12
				POT1			SEC24B
				CCT7			DNM3OS
				MMP11			PPFIA2
				EEF1A2			SUSD3
				DUSP23			BOK
				CCDC167			MYEOV
				SAXO1			FXR2
				VAC14-AS1			ADAM28

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				VPS29			MUC6
				RAB24			MYL3
				CCDC102B			LOC101927093
				HERC1			IGSF11-AS1
				NPAS2			RAX2
				HDDC2			LOC100506885
				INPP5F			TCL1A
				FAM111A			MYLK
				NCOA5			KRTAP4-11
				EMCN			DOK1
				DUSP12			CYP4F2
				CGREF1			B4GALNT3
				SLC25A40			UNC5C
				VASH2			PRIMA1
				INPPL1			FCHO1
				PDZK1IP1			OR2L2
				IRAK1BP1			GPBAR1
				DIAPH3			CFAP69
				COPB2			LOC101927690
				BUB3			SNX9
				FOXD2			ZNF132
				CTR9			AQP3
				VIL1			WNT2
				IFFO1			SIRPA
				CDC27			LYVE1
				GGH			IGFBP6
				ZNF767P			PDX1
				COPS6			LCN10
				COL9A1			SAMD11
				VPS35			TSC22D2
				ZNF664			ASPG
				ASNA1			SMAD1
				PSMD9			PLCD1
				COL4A2			ARHGEF15
				ZFP62			NPHS2
				KDM5B			SRD5A1
				PPP1R13L			CLCN1
				BPGM			PALM3
				ZNF563			CEACAM21
				GFPT1			PDLIM4
				ME2			NAAA
				KPNA4			ABHD13
				H3F3A			CLEC7A
				WDR61			CCPG1
				MRPS10			DCBLD1
				SIRT7			ATP1A4
				RABIF			P3H2
				PFAS			IL17F
				PPIL3			NAPSA
				NUCKS1			MUT
				PPP4R3C			NOP53
				RPLP0			NAT2
				RCOR1			PRG2
				U2AF2			PIGQ
				SMAD2			WDR87
				CPLANE1			POU6F2
				ZNF44			CLSTN3
				YWHAG			GBP1
				TMEM68			LINGO2
				MTFR2			LINC01350
				PPIH			ZNF408
				ZNF555			WDR7
				FAM200A			HLA-DPB1
				ZMYND19			SLC25A27
				EIF2B4			KIR2DS2
				EIF5B			HSD3B2
				CENPE			GNE
				LEO1			CEP85L
				YAE1D1			TUSC3
				AAR2			TNKS1BP1
				BPNT1			RTP5
				ACTR3B			LINC00165
				MYL12B			LOC101927950
				NEK5			PLSCR1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PUM2			KRTAP4-4
				RALGAPB			MYF6
				PARP12			VENTX
				PIGH			FEZ1
				CMSS1			EVI2B
				SLC22A23			MGST2
				EMC2			PLEKHG4B
				SRSF7			TRPV4
				LSM14B			SLC25A11
				MPZ			PAOX
				VKORC1L1			NCKAP1L
				PRAG1			NOX5
				FLJ37453			MAPK8
				TLN2			SYNCRIP
				ZNF493			TSP02
				HDAC4			ESS2
				AFDN-DT			CCDC38
				STK36			TMEM108-AS1
				PCLAF			LINC01126
				HMG2			LOC102724880
				ROMO1			STAR4
				SMKR1			NRGN
				BRPF1			PID1
				KIDINS220			TAS1R2
				TIPARP-AS1			MTAP
				TBCE			COL6A5
				LOC105373150			ASMTL
				PLCB4			ZFYVE28
				MAPK1			ACTL7A
				MPHOSPH10			RAI2
				HNRNPA2B1			HYAL4
				RNF216			SYTL2
				TSC1			TMBIM6
				NARF			ANKRD44
				UTP18			GZMB
				TMEM70			FCGR3B
				PPP1R14B			LINC00307
				SBF1			BMP1
				HIST1H2AM			CPNE6
				PLA2G1B			CYP3A43
				ZNF793			CAPS2
				GTF2A2			DPF1
				RHOU			SMPD3
				ZNF691			MMP26
				TACC3			RASL11B
				RBM45			GRID2
				SEM1			CALN1
				GNAZ			CYBB
				PDCL			CYTIP
				DMXL2			SHB
				EID1			CHST7
				DCAF6			SEMA6D
				DHX8			LMBR1L
				NAE1			LOC102724612
				ZC3HC1			SLC7A11-AS1
				RBM14			KCNJ3
				NUPL2			TBX18
				UBE3B			NOP14
				COPE			GVINP1
				SF3A1			GCKR
				IQCE			NTF3
				EIF3A			PPP1R9B
				COA4			PATE1
				SPOP			SNRK
				PTRPF			GUSB
				BLVRA			IGHG1
				DANCR			GSDMB
				RASL12			LOC101927211
				MAML1			FBP1
				BTN2A2			TRY2P
				TYK2			LINC01082
				NIPSNAP2			RAX
				THBS4			CCL1
				ENTPD1-AS1			MACC1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				SDHAF2			LACRT
				ARHGAP1			LOC100129503
				MED7			CXorf21
				ENOX1			GATA3-AS1
				ZNF706			OXCT2
				RRP1			OR1C1
				PGAP1			IL17RA
				LOC101927027			LINC01859
				HOXD10			LOC729683
				TMEM203			ZNF853
				CBR3			LOC101928635
				ANKRD36C			CAMK4
				RPL32P3			GALNT14
				POLR2F			LMNTD2
				KIAA0391			CLPX
				GLMN			TNFRSF14
				LOC101928403			LOC105370612
				MCM7			CCDC184
				TRIM52			CPLX2
				ZNF786			ARSD
				DCLRE1A			FGF5
				HIST1H4D			LINC00466
				ARHGEF28			VWC2
				PRPF31			RNF133
				MRPL55			SLC35D1
				RIOK2			ERLIN1
				LOC100507634			NMRK2
				CCNQ			CHCHD10
				SLC22A15			REPS1
				REXO4			GLRX
				HSPA14			CD70
				ZNF142			CELF2
				ANKHD1			LOC102724382
				CFL1			SH2D1B
				LINC00189			FBXW7
				UMAD1			SUCLG2-AS1
				EML6			HHLA1
				CPSF6			ERVH-3
				BRD7			NR0B2
				CEP55			OSBPL9
				DTYMK			MYOZ3
				EYA3			PLIN5
				KRT20			PDE4B
				BOD1L1			SLC25A36
				SFI1			LOC145474
				AMMECR1L			CCDC87
				ZNF501			MAPRE2
				ATF2			IL1RN
				SLC39A13			LOC284898
				GABRD			KRT7
				FBXL22			MAFB
				COPG2			IQCF3
				IARS			SGCD
				DYNLL1			BBS5
				WDR53			KIZ-AS1
				HSPA12B			CMTM5
				LOC100996419			GFER
				CD163L1			LINC01550
				ZUP1			SEC62
				LOC101928487			PQLC1
				DENND6A			CYB5R2
				LOC728743			GJC2
				DNAJC8			KRT19
				HDAC8			GABRB3
				SRP54			PCBD1
				DNAAF2			C20orf203
				NIF3L1			ANKRD20A11P
				TRA2A			LCP2
				KLB			GAB3
				JADE2			SEZ6L
				SMIM31			ISOC1
				VAMP5			SLC25A10
				RFC1			LOC101928651
				ANXA2P3			LINC01115

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				TUBA1C			GRM7
				TRNT1			TNFRSF13B
				TTI1			SLC39A8
				PIK3R2			STS
				CRIPAK			IL4R
				EBF2			LOC101928271
				SP2			CCL5
				TMEM38B			SPP2
				CCDC91			ALDH1A3
				DNAJC21			RPS6KA2-AS1
				SRD5A3			CCDC69
				NFE2L1			C1QTNF12
				ERICH4			ZFAND5
				MTFP1			MAP1LC3A
				STIP1			LOC102723380
				NT5DC2			MNT
				PSMB4			ZSCAN23
				HLA-G			OR51E2
				MTDH			ADGRF3
				UXS1			SMIM5
				SART1			TAS2R13
				HSP90AB1			ZNF628
				C11orf45			ZNF438
				GEMIN2			PLPP3
				ZCCHC17			PURB
				NDUFA1			NLRP1
				HSPE1			KIR2DS1
				ZNF573			LOC101929512
				RPS6KL1			LOC100506411
				GTF2B			RPS27L
				RGL2			IQSEC3
				FER			TGFBR3
				TRPC6			UMOD
				ARPC1B			LINC01583
				NAIF1			PPA2
				UTP6			MIR4313
				LIG1			EPOP
				HYLS1			SPSB4
				LSM8			SLFN1L-AS1
				TMEM97			KCNN2
				ZNF616			KLHL34
				PLA2G7			DGKE
				SUZ12			EPHA5-AS1
				VARS			CAT
				TERT			C15orf32
				MRPS16			ANKRD53
				CEP19			CTAGE11P
				KCMF1			LOC414300
				MCMDC2			KAAG1
				WWC3			RBMS3-AS3
				CDK5RAP3			PRKCQ
				YTHDF2			TMEM59L
				STRA6			CPOX
				TCEA1			KIRREL3
				PLPPR1			LINC00968
				SPA17			FAM78B
				MRPS36			MYOG
				KBTBD4			UBE2D4
				TRIM28			MEI1
				PJA1			AK5
				CNIH4			SYCN
				BZW2			OLFML3
				GGCT			NDRG4
				MPV17			CNDP1
				HTATSF1			DOK2
				PSMD4			CFLAR
				LYSMD3			TOR4A
				NDUFA7			ACACB
				JMJD4			LINC02270
				LOC100506639			CYB5D1
				RNF24			FAM210B
				GPX8			USP12
				HIST1H2BK			LINC01487
				SLC29A1			TCTEX1D1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				UTP11			FGD3
				ALG8			DOC2B
				MRPL27			MRPS25
				RIOX1			HSBP1L1
				USP27X-AS1			KRT25
				ZNF606			DLC1
				TFAP2A			PRKACA
				SSR1			PPP1R1A
				RBFOX2			SPRY4
				SNRNP35			KATNAL2
				TIMELESS			GRAP
				NUP107			ELMSAN1
				DDX10			PNPLA7
				IDH3G			KCNH7
				CASTOR1			SEMA4A
				ARFGAP3			AHSG
				RAB11FIP1			LINC00944
				CSNK1G1			MIRLET7BHG
				ZNF26			LRRC75B
				KIF13A			FXYD1
				RPA3			LINC01227
				RAC3			STX1B
				DLGAP5			SHISA7
				AK6			VSIG2
				C12orf45			RUFY3
				PCDH17			CLDN1
				PHF8			PCTP
				TMEM14B			ICOS
				GRINA			VRK3
				ADIPOR1			SIRT1
				DNAJB2			WFDC8
				LUC7L3			ADGRA1
				SNF8			RBP3
				ISX			PRM2
				RAD51AP1			SPRR2G
				HAT1			IL1B
				RC3H2			GVQW2
				OAZ3			SYCE1L
				TMEM87A			SP8
				IFT27			KCND2
				CYP17A1			COQ4
				PKIA			WIPF1
				ESCO2			BMX
				STX10			AGXT
				LOC100507377			LY86-AS1
				TNNI1			PTPRU
				DNTTIP2			PICART1
				ENO1			SLC24A3
				ZNF143			FAM228A
				TIPRL			LOC100996251
				GOSR2			CLTRN
				DDX1			C11orf96
				SP3			DDX25
				BFSP1			FAM57B
				UBE2Z			ERVH-4
				LRRC20			ASMT
				ZNF106			TSGA13
				RNPS1			TMEM192
				COL4A1			NPVF
				RNASE1			RIMS4
				STK19			RSPO3
				TBC1D7			RAD54L2
				MKI67			TSSK2
				VPS54			MPRIP
				GLS			TXN2
				DCAF10			CLEC11A
				SEC11A			TOLLIP
				CLSPN			HAMP
				NAV3			LINC02347
				ZNF560			DLK1
				LOC101928277			LOC101928012
				SMG7			HMCN2
				TMEM115			CLEC12B
				PRIMPOL			ELMO3

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PSMC5			GPR68
				ZNF564			LTK
				ANKRD13A			DKKL1
				PAXBP1			ARMC5
				EXOSC4			FUT7
				PLGRKT			EPAS1
				ZCCHC11			PRELP
				LOX			LINC02053
				SYPL1			LINC01204
				EME1			CYP8B1
				RELB			HSDL2
				BUD13			JDP2
				FNTA			TMEM184C
				ZNF782			HACD4
				SUCO			HSPB7
				TATDN3			ERRF1
				MAP3K7			LOXHD1
				ZNF512B			NPBWR2
				UPRT			WFDC1
				ATP6V0A1			LINC01158
				EID2			OR3A2
				MIPOL1			KRT84
				PPP5K2			PSAPL1
				GTF2I			DHX58
				PALD1			ADM5
				DYNC2LI1			TREML1
				ZNF746			KNCN
				KDM1B			IFITM1
				TIRAP			LRAT
				CNOT8			LOC100506114
				GORASP2			IL18R1
				APH1B			MMP19
				ADAM17			CCER1
				USP36			EPHA8
				LYZ			CLEC10A
				LINC00467			AMOT
				TPM2			C8orf74
				CPNE1			TIMD4
				FAM219B			TSHR
				ZC3H4			SUN5
				SEMA4F			LOC286359
				NUDCD3			FLJ20712
				RPL37A			LINC00317
				PDZD11			NAT1
				PPP1R11			HGFAC
				ELAVL1			CYBRD1
				GCNT3			LOC283387
				PIAS4			PEAR1
				NCOA2			AUTS2
				FAM118B			OBP2B
				S100BPB			CDA
				IGBP1			TCN2
				LZIC			LOC101928841
				WDR48			TMEM88
				CDKN2C			RPRM
				GUK1			BANCR
				METTL13			LOC339298
				LSM2			HAP1
				PREPL			PPARGC1B
				HNRNPA3P1			OR14J1
				GHRHR			RNF123
				ABCB6			COL27A1
				HINFP			ZFP42
				VPS72			CCDC78
				ZMAT2			KDSR
				EIF4H			TAS2R50
				ACP6			MCM8
				C9orf40			PHLDB2
				RPL11			CYFIP2
				TEDC2			TMEM56
				TUBB4B			BMP5
				AZI2			SPATA8
				SOWAHA			CEBPE
				RPL8			ZKSCAN2

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RBM39			PZP
				RAB1A			CRYBG1
				LOC257396			CD3E
				CUTALP			C2orf40
				RPARP-AS1			SRRM2
				FAM21EP			FCRL1
				PMS2P3			PRR9
				NFXL1			LOC101928461
				SNX12			PGLYRP3
				KPTN			LINC00939
				ERI3			LINC02116
				MRPL42			AMIGO2
				FBXO38			LRTM2
				PCBP2			SIK1
				MUC13			ZCWPW2
				HAX1			KCNJ8
				ZKSCAN3			GLOD5
				MFAP1			IGHV5-78
				REN			HSD17B6
				NUP205			ITIH4
				RMST			TTY10
				GABBR2			ADARB2
				TDRD7			PIM2
				CTSA			CPNE7
				TPRKB			EVL
				C5orf22			PIPOX
				TIMM17B			HGF
				SNX15			IFNA21
				RNF8			SERPINA10
				IGF2R			CFD
				RNF181			TMEM256
				PCAT7			REEP2
				ATP8B3			FAM238B
				RBM15B			SATB1
				COLGALT1			LINC01737
				METTTL27			COMT
				SBF2-AS1			CACNA1G
				AGBL5			PDLIM5
				ZMPSTE24			SPHK2
				PFDN4			LOC200772
				APEX2			C1QTNF1
				PSMB3			LOC102724094
				SNRNP200			RUBCNL
				RPL10L			SCARF1
				ZBTB3			APC2
				RPS25			LINC02148
				TOP2B			KRT75
				LOC101928000			LINC02114
				DNM1L			LOC100505918
				EIF1AD			C9
				LOC101929592			TMEM63A
				ITGA7			FAM212A
				MTIF2			DUSP13
				ZNF207			EYA2
				EXOC7			CD1C
				KLF13			ADGRB1
				NLE1			CERS4
				TAF15			EFS
				TMEM61			ADGRE1
				PFKFB4			MYADM
				MED19			PDE3B
				LRRC57			LINC02243
				GRIA4			L3MBTL1
				IDE			GNRH2
				PLVAP			ACER1
				PAGR1			BICDL2
				ALKBH6			IQGAP2
				POLR3GL			ACTR3C
				POLD3			PCP2
				BEND3			DERL3
				GYG1			NPDC1
				TXLNB			RBP5
				ATP8B5P			ANKS1A
				LCAL1			CLPB

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PHB			COBLL1
				R3HDM1			TEX264
				WDYHV1			SLC30A9
				MKRN1			VAMP2
				ANXA7			ZFP92
				NXT2			CCDC25
				MORF4L1			SLIT1-AS1
				GAPDH			LINC00326
				POU2F1			PRCP
				COX7C			TSPAN11
				APC			XPNPEP2
				ZC3H15			OTUD1
				ZNF233			RNF135
				ELK3			PDE6A
				SEC61B			SPIB
				COMMD9			TEX45
				RRP15			LINC00445
				GALNT1			MYO1B
				SBNO1			HPN
				SLC39A1			PRTG
				ANKMY2			CD81-AS1
				PLEKHA5			C11orf42
				ARCNI			C12orf42
				POLR2E			FGL2
				PIGC			ZSCAN18
				TRMT1L			MICU3
				HIGD2A			SLC17A1
				ZBTB25			MATK
				TLL5			PTEN
				VNN2			ARSF
				BEST4			AFF1
				NAA11			C1R
				CNOT11			C2orf73
				LOC100310756			KIR2DL2
				REG3A			ROGDI
				TRAFD1			RBFOX3
				CTTNBP2NL			CILP
				PGS1			PROZ
				FSD1L			PLCB2
				TECPR1			DIAPH3-AS1
				MIEN1			TMEM204
				C8orf33			PTPN18
				NME1			C17orf67
				RCC1L			KCNF1
				MAP3K11			GPR180
				ACOT8			ZNF843
				ZNF280A			LINC01416
				EPM2AIP1			KLHDC4
				RPS9			ODF3
				FAM222A			LDHD
				RBM28			SERPINA6
				SELENOT			DOCK2
				ZNF883			GABARAP
				CEBPZOS			FABP7
				HNRNPA1			LOC102724587
				GPS2			KEL
				RALBP1			IFT46
				GIGYF1			KLC4
				HGS			SYNPO2
				POLA2			FPR3
				TP53RK			KCTD15
				FBXL13			CD1D
				NOL10			PRAM1
				KAT7			NGF
				EDEM3			AADA2L2
				TCOF1			LOC105378052
				IFI27L2			GK
				RANBP9			AK3
				GJA5			SLCO1B3
				SLC17A5			DNAJB1
				C4orf46			CHID1
				SOX18			LINC02135
				CPLANE2			PIK3CD-AS1
				ZNF235			COX14

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				ACSL4			LOC101928833
				REPIN1			LOC147004
				ARL8B			FLJ20021
				ERC1			GIMAP8
				SMIM13			RAB3C
				NKIRAS2			PPM1J
				PPM1D			GPR101
				TRMT5			VSTM2L
				VPS45			TRIM22
				YPEL3			PLEK
				PPP1R7			NLRP3
				TP53BP2			B4GALNT4
				ZNF850			GPR3
				C18orf21			MDGA2
				VGLL4			FBP2
				SPC24			FBXO8
				PIP4P1			LINC00574
				ZFAT			CD33
				EFCAB11			BCAN
				C1orf43			H1FOO
				USP27X			NAPSB
				LETMD1			SLC25A26
				GOLPH3L			SNORA71A
				STT3B			LINC02171
				CD3EAP			TGM2
				ZBED5			BASP1
				LTA4H			SOX21
				MAGEB2			CSPG4P5
				FANCG			LYRM1
				DCAF17			DEFB1
				CCDC24			POU3F4
				CKAP4			ARHGAP30
				LINC00847			ACTL7B
				ZNF224			TMEM86A
				MCTP1			PHACTR3
				ZNF652			RMDN2
				TRIM68			EPHA2
				MOB3B			C7orf69
				STEAP1			ADAM5
				RPL39L			TCHH
				PGK1			TTY12
				RNASEH1			WFDC5
				FAM50A			C3P1
				CDYL			ZCWPW1
				BLOC1S4			MAGEB18
				MINCR			DEFA4
				MTFR1			NMRK1
				GPAA1			PROK2
				SMNDC1			SH3GL1P2
				LTV1			ACAT1
				DONSON			DACH1
				E2F8			PLK3
				SPINK1			ZNF274
				NBAS			ATF3
				FIBP			CARD11
				YIF1B			KRTAP4-3
				TBCB			TMEM45A
				RTL8A			APOL6
				MEF2D			LINC01792
				CNPY2			DAB1
				ANKRA2			RTN4R
				RCBTB1			SYT2
				WASL			EVI5L
				FAN1			LCT
				RNF25			BTG1
				TAF5L			DICER1
				SOS1			SLC26A8
				ARHGAP11A			LOC731157
				PLAU			ZNF749
				TSTA3			FOLH1
				RAC1			LINC02395
				CCDC59			SRPRA
				KMT2E			LOC91450
				MED20			LINC00906

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				MOB2			GPR173
				TOMM20			ALK
				FBXL12			DACT3
				DNAH14			TNFRSF14-AS1
				FRMD3			TRPV6
				ZNF189			PCMT1
				GTF2A1			SOCS6
				AGFG1			RAB37
				TBC1D14			FRRS1L
				PNKP			AFG3L2
				SETD2			FAM83C-AS1
				SENP1			PTH2
				S100P			KRTAP4-6
				MATR3			NEUROG3
				UGGT1			LINC00929
				PACIN2			TFCP2L1
				SEC23B			STEAP3
				DCK			HSPB3
				TIA1			ABCA1
				TXNDC15			CSF1
				SPTLC1			CLEC2B
				HILTF			CEP170B
				HMGB3			SLC8A3
				TOPBP1			ULK1
				MAFG-DT			TMEM143
				ZBTB34			SNHG18
				NDUFA6			ACOX1
				NDUFAF3			MALRD1
				C9orf85			HAO1
				SLC22A4			SDR42E1
				ZNF826P			MUC7
				VCP1P1			LBP
				NETO2			MRGPRX4
				GALK1			IDH2
				NUP214			SEC31B
				TUG1			LOC151174
				NOSIP			S100A5
				SNHG4			ZNHIT1
				TRIM23			RNF180
				FBXL6			COPZ2
				SOX13			LOC100505985
				SSH2			LCN12
				LINC01419			LOC400627
				EIF3B			C9orf66
				DSCR8			DHRX
				ALPK3			MRV1-AS1
				PTPDC1			ODF3L2
				FLVCR1			KCNH2
				BIK			FOXD3
				NRP1			GCM2
				CDH13			ADCY5
				LYRM2			LINC02402
				UBE2E3			SRPK3
				GJA1			REC8
				MED29			IGFALS
				MRPS14			LOC101927069
				METTL8			ZNF547
				PHLPP2			MORN1
				TAF7			RASGRP2
				BTNL9			CFAP97D1
				RFC3			TSC22D3
				ZNF219			TMEM217
				ILF2			CFH
				MAB21L3			PIGR
				NSD2			CMC4
				ZNF500			PINLYP
				AIDA			OR13C4
				PSMA3			NRP2
				NOM1			LOC100505664
				FARSB			FUT6
				ASCC3			EEFSEC
				STAM			PTPRB
				ZNF202			GJA8
				ACTL6A			MROH7

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				CLDN4			ACP2
				TBK1			CECR7
				MANBAL			METRN
				RPL29			MRPL54
				VPS26A			LAG3
				PAN3-AS1			KRT3
				MPPE1			MOG
				PIGZ			CADM3-AS1
				LYSMD4			GIP
				CRLS1			LINC01917
				ZNF277			CASC18
				ZNF704			WDR88
				EIF3J-DT			LOC284240
				RAB30-AS1			FAM86B3P
				PAIP2			CCDC196
				SQSTM1			ISOC2
				GABPB2			TMEM44
				CSGALNACT2			GYPE
				ADAMDEC1			SPAM1
				PTPN11			APLNR
				C7orf26			MIR1-1HG-AS1
				PLEKHA8P1			TANC1
				RSL24D1			TBC1D28
				UCHL1			IGLL3P
				UBE2F			LINC01366
				WDR54			MMAB
				NPHP1			PAPPA
				TMEM267			CYP4F8
				ZNF397			LOC101926915
				NDUFA11			RAB26
				DAP3			EVI5
				KIAA1958			HTR3C
				JADE3			GET4
				LINC00623			LINC00565
				MIS18A			SYCP1
				P3H1			SPEM1
				DVL2			DLL1
				LOC100133315			DTX1
				KLHL23			LINC00879
				GEMIN8			CACNG4
				CNOT4			GF1B
				SSBP4			CABCOC01
				PSMC2			HSPA4L
				GGA3			ZNF771
				DCST1-AS1			MIR622
				CAPZA2			SCRG1
				LPGAT1			MTTP
				TEX19			LRRC37BP1
				PCYT1A			MGAT5B
				BRMS1			ECM1
				MAPKAP1			SIX3
				SFR1			HDAC9
				CHST1			NYX
				THOC2			GZMK
				CYFIP1			IL36B
				TAF1B			EPB41L1
				UBQLN4			ABHD15
				LOC728392			MNDA
				COL15A1			OR7A5
				MFAP3			MUC8
				EXOC6B			MSX2
				PIAS3			OR1D2
				HIST1H2AE			IL17RE
				HDAC5			KIAA1549L
				SRI			HHIP-AS1
				HLA-E			RBBP8NL
				AKAP14			MPC1
				LMLN			ZCCHC24
				MRPL24			LY6G6C
				GON4L			SPATA3-AS1
				SGPL1			ZBTB43
				GREB1			S100G
				SWAP70			STAP1
				MOSPD2			TGM5

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				TRIM31			TPBGL
				GSTA4			FCN2
				PM20D2			RPS2P45
				TCAM1P			FBXO40
				MGST3			NKG7
				PRPF19			F11
				HIST1H3B			LOC101928940
				LSM14A			DNALI1
				USP49			C11orf86
				TEFM			CCL27
				ACBD6			LOC101928230
				RPA2			LOC105377276
				YEATS2			TCEA2
				PQBP1			PNLIP
				JTB			FLJ21408
				THBS3			ZNF80
				BCLAF3			LRRC66
				EDC3			LOC101928909
				SMARCB1			LOC114224
				GMCL1			FAM149A
				FNIP1			SPINT3
				NABP2			KAZALD1
				MRPL47			RTL5
				MGAT5			SLC19A3
				MBOAT1			CDC37L1
				IGSF1			RCOR2
				LINC00294			TENM1
				MRPS11			SLC2A8
				TEAD3			STEAP4
				ARID3A			IL13RA2
				MATN1-AS1			FES
				STOML1			TXNRD2
				EFNA4			AOC3
				LOC155060			C4orf19
				KIF5B			MIR4296
				TWF1			VWA5B1
				POLM			DNAJC9-AS1
				MRPS17			LINC01343
				NUP153			SNAPC4
				CSDE1			SLC9A7
				MYH9			IGHM
				CENPH			KLLN
				CLPTM1			CTSS
				AMZ2P1			LOC100506113
				C1orf56			LRRC29
				MYEF2			LILRA2
				NOP2			NEMP2
				ZNF836			TMTC3
				ASF1B			GS1-279B7.1
				RAD9A			LCK
				PACRGL			LUC7L
				SPOPL			HSPB2
				COPZ1			OR7E156P
				TAF2			ACKR4
				ADAMTS9			QPCTL
				KATNA1			INF2
				TSEN15			ANO1
				TMEM237			DEFB124
				RPS4X			LINC02387
				CCHCR1			TPTEP1
				TRMT10B			KIR3DX1
				CELFB			MAPT-AS1
				RPS27A			HLA-DPA1
				RPS3			ANKRD46
				COL21A1			SMIM12
				FKBP14			APOA5
				FAM216A			MYO1H
				E2F1			LOC100129603
				CTS			NALCN
				ENO1-AS1			GMIP
				CLP1			CHST4
				NPAT			SYT15
				COIL			KRT76
				HAUS6			SMAD7

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PRKD3			UNC13D
				SWT1			FAM99B
				CDC25C			CFHR4
				RAB11FIP2			SOX3
				RCOR3			TMEM253
				TSC2			SDC4
				TOLLIP-AS1			TMC8
				DHX30			FHL2
				COX7B2			RRN3P1
				MAU2			HIGD1A
				SIPA1L2			ADRA1B
				SPTAN1			NUDT6
				CCNG2			RNF112
				ITSN2			DES
				LRRRC69			LOC101929680
				ODR4			CCDC158
				ACTR1A			FGFR2
				PPARG			ASPA
				BBS10			LINC01657
				CNN3			CTSLP8
				PRDM4			GH2
				IRF6			MMACHC
				HSPA4			BEST1
				RHOA			PPP2CB
				DHX40			DUOX1
				RRP9			ZRANB1
				DCTN3			AVPI1
				NT5C			RAD52
				ZWILCH			CD7
				IFT80			CD207
				CXCL11			CHAT
				ANKS6			HR
				PSMG2			MYCT1
				ZNF639			C6orf99
				GNB1L			S1PR4
				C11orf58			MS4A5
				ZNF407			TNMD
				GPALPP1			MYH10
				SUN1			IL22
				C12orf10			TTC39C
				MYL6			STX11
				MAPT			LOC100506929
				ASB3			CYP7B1
				CASD1			KCNC3
				HOXD4			OR10J1
				SMAGP			TBXAS1
				SMC4			LOR
				C8orf37			INTS10
				CTAG2			MAP6D1
				RGS19			ALDH1B1
				POMZP3			COX1
				ZNF441			ZC2HC1C
				NRAS			HIFX-AS1
				CENPO			LRRN4
				RPL22L1			ARG1
				ZNF138			KIF5A
				FAM208B			FCRL2
				OGG1			OPTC
				DYM			PCK1
				ZSCAN16-AS1			KBTD11
				TMEM165			NPR3
				AFP			DMRTA1
				ZW10			OLAH
				TUBA1B			IRAK3
				RPS19BP1			ALPPL2
				FOXJ2			SULT2A1
				ZNF343			REV1
				UHMK1			CTRB2
				CEP162			TMC1
				TADA3			TBKBP1
				HECTD4			IQCF5
				ELOVL7			GAMT
				BICRAL			TREML4
				RNF20			PNPLA1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				GOLGA1			TRMT44
				MEA1			SLC6A13
				TIGD1			LOC100506563
				PIK3R3			MIDN
				FAM169A			TBX1
				CDPF1			PYHIN1
				NEK7			DHTKD1
				C4orf48			SH3GLB2
				CORO1B			CYP2E1
				BORCS5			GALM
				FSTL4			ACO1
				ACTR6			WDFY4
				AGO4			SPINK7
				CHCHD7			OPRL1
				COG2			ATF5
				PPP1CC			LOC101927811
				PAXIP1			LINC01734
				ZNF92			MEGF9
				SLBP			IL15
				CDCA7L			GABARAPL1
				CCDC138			HTRA3
				FAM222B			CYB5D2
				UBL4A			LAT2
				NR2C2AP			LIG4
				CKS1B			VSIG4
				ANAPC7			AGTR1
				MCM3			HAR1A
				RPS2			OTP
				INO80E			MAP3K10
				FAM110A			LOC105374325
				NDUFA4L2			LCTL
				C17orf75			MTERF4
				NBPF1			USP2
				SNRPE			OBSCN
				BICDL1			ABCG4
				CCDC170			TNFAIP8L1
				LEPROT			SLC52A3
				CUEDC2			ESD
				DDX42			LOC728095
				WDR24			PNRC1
				TNFRSF4			RRBP1
				NME6			FCAMR
				MHP			KLC3
				AP2M1			LINC00982
				FAF1			TRIB1
				OAS3			CLDN17
				SLC22A11			C12orf80
				TEAD2			PTPRT
				STARD3			PER2
				VPS39			ICOSLG
				TUFT1			KY
				ZXDA			TYSND1
				MORF4L2			STARD13-AS
				ODAM			NXF1
				RPL7			RPH3AL
				IFT22			OR1Q1
				MRRF			HPGD
				GSTO2			LOC400499
				MYOF			TRERF1
				TAF1A-AS1			GSTT4
				PRKAB2			ANKRD24
				ADGRL4			ADSSL1
				AFF4			GLI3
				RAF1			ANO7
				SUB1			SMIM19
				MRPS33			CYP4A11
				PRPF6			SPRR1A
				ZIC1			LRRC10B
				UBE2M			LHPP
				AKIP1			OSBPL6
				SOX12			ASMTL-AS1
				RHNO1			LOC101927723
				RAD51-AS1			CCDC70
				KIF20B			SH3TC1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				RAMP1			RAB36
				GAS2L3			CRYGB
				FKBP1			GRIA3
				PRORS1P			AVPR2
				SELENOF			CMTM6
				BLM			GRB14
				KCNE5			NTRK3
				NACAP1			LINC01425
				SF3A2			FOXO2-AS1
				DNLZ			REG3G
				RIMS3			SERPINF2
				FN3KRP			RXFP1
				COPS2			OR5E1P
				GATAD1			MIAT
				LOC100507557			OR12D2
				PSMB2			CUX2
				GOLGA8A			ATP5ME
				SNRPD1			ZBP1
				NCAPG2			CCDC151
				PCAT6			LOC102724449
				PARTICL			TNFRSF13C
				LPCAT2			ZNF503-AS1
				LINC00853			UBAP1
				LINC01296			SLC35E2B
				ITGAV			MST1L
				CLDND1			AZU1
				GDAP1			CDRT15L2
				PIP5K1A			THAP3
				BTBD2			LCNL1
				PCNA			VPS13D
				PCDHB2			CCDC62
				GPATCH4			FREM2
				RBBP4			IL12A
				TWF2			TBX15
				PRKAR1A			PRB3
				B4GALT6			BMPER
				LOC100506844			LOC100130964
				AP1M1			CCL2
				PRELID3B			PUS10
				CYC1			FUT10
				RPL22			KPNA1
				EPRS			LOC100505915
				SGTB			KRT81
				CHUK			SLC7A8
				HS6ST2			ALDH3B2
				PDPK1			NIM1K
				DENND4B			MOGAT2
				SRGAP2			C16orf86
				DCST2			AGAP2
				GPN3			PDE1A
				PCDHB4			ACADS
				CD2AP			TMPRSS2
				CCL20			SIGLEC6
				ZNF792			SNAI3
				ZFP30			MS4A6E
				CCDC86			LOC101928902
				LOC101927943			ENKD1
				ZNF234			KCNK4
				BEND7			EPHX2
				STXBP5			GTF2IP7
				TMEM9B			KRTAP10-11
				KXD1			KRTAP1-1
				CWC27			AGAP2-AS1
				USP25			CCDC8
				NSL1			NANOS2
				KIF2C			GPR26
				PSENN			SEMA6A
				BABAM1			FAM151A
				FAM168B			CHAC1
				RAD51C			MAST1
				CNNM4			HMGA2
				CYB561D2			ING2
				MYO5A			EMX1
				MEGF8			LOC645188

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				ADAM10			FAM186A
				CCSAP			ISYNA1
				FAM220A			CREB5
				CNTNAP4			SHF
				GNG4			ZFR2
				CHST14			ZNF316
				DRAM1			LOC101928123
				LOC646762			CCDC68
				CAMLG			LOC105370832
				CXorf40A			ACSM5
				RSAD1			LOC101928283
				TTC32			SLC4A10
				LOC100507670			GPR31
				ZNF217			PLIN1
				AGPAT4			KIAA0040
				KANSL1			LOC101929517
				NOX4			GRTP1-AS1
				FAM53C			KRT2
				VWF			TMSB4Y
				ZBTB26			LINC00844
				TPM1			MIR3936HG
				PDS5B			RBKS
				DIEXF			RIN1
				HIRIP3			PHLDB1
				ZNF101			TMEM86B
				TIMM29			LOC91370
				LOC100270804			CPNE8
				MTIF3			RILPL2
				SCAI			KIFC3
				IQCG			SLCO4A1
				TULP4			M1AP
				CRTC2			IFNL2
				TECPR2			SLC37A4
				LOC105371622			LOC100505824
				SUGP1			SLC25A25
				HNRNPUL1			TPSAB1
				SNUPN			ZC3H13
				PKNOX1			WDR81
				SIN3A			P2RY13
				BMP4			ENG
				NDUFV2-AS1			MFS6L
				SFRP4			LINC01310
				OSTM1			KLF1
				CLCN7			NMUR1
				SLC12A9			ID2-AS1
				PDCD2L			KCNK2
				AHSA2P			SULT1E1
				CCNYL1			GLUD1
				RNF115			TSPOAP1
				ISG20L2			DNM3
				DDA1			KIAA2012
				STRAP			LINC01555
				CBX8			PLA2G3
				LOC100289230			ACRV1
				C20orf196			HPD
				CYYR1			MMP28
				RFESD			DPF3
				UBXN2B			HMG5
				MAT2B			SLC25A47
				PRDX5			MFAP4
				VDAC1			CCDC36
				PPIA			GZMH
				CSNK1D			TYROBP
				MED6			LINC00309
				TJP1			TMEM158
				ERLEC1			BDH1
				TPRN			C11orf21
				ZNF599			PTPRS
				CD46			ECM2
				ZKSCAN4			COTL1
				PMS2P1			SFRP5
				RBM12B			ARHGEF37
				CIR1			GUCA2B
				TAF4			LINC00856

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PMFBP1			DLG2
				RETREG2			UROD
				GABPB1			PDE2A
				UTP14A			ZNF276
				WRAP73			RRP8
				DQX1			LOC101928847
				TBP			ZYG11B
				LOC101927974			NCKAP5
				MRPL17			CD244
				JCAD			MGLL
				DNAJC18			DNM1P46
				FAM86C1			PTPRD
				CENPBD1P1			CYP4X1
				MTBP			MYH15
				TUBB3			CRX
				NELFB			LINC02172
				GID8			SHISA6
				ARHGAP19			KIF2B
				TWNK			PLK2
				ERCC3			SCARA5
				TP53BP1			EBF4
				TADA2A			LINC01118
				AMACR			PRG4
				TFRC			ARHGAP9
				NEDD1			DARS-AS1
				TINF2			LINC00327
				DDX46			LONRF3
				09-Sep			LINC01877
				VPS13A			SLC5A12
				PFDN5			CRYAA
				NSUN3			BACE1
				BHLHB9			PLEK2
				ILF3			HERPUD1
				POLR3C			HTR1F
				C12orf57			TMEM95
				NANP			SLC28A2
				HAUS8			GRASP
				ZNF621			RBAKDN
				DYNCL12			LIME1
				NIPAL2			ZNF663P
				FANCF			CPEB2
				SP2-AS1			LINC01146
				TBL2			ANKRD19P
				CCNC			ADM2
				PEX6			SERPINA7
				TMEM187			CCDC182
				DCAF16			LRRK1
				MAP3K1			TEX44
				PBK			NXPE4
				ZBED8			FAM47C
				CPPE1			HMGB4
				ALDOA			STARD10
				EXOSC5			ADPRH
				GAB2			KCNS1
				TXNDC16			HTR1B
				CEP89			KLF8
				PRRC1			ADAMTS1
				AIMP2			GRAPL
				HSDL1			PRKG1
				IQCB1			RASGRP1
				TMEM184B			GPR27
				COA1			CADM3
				NOMO3			CFI
				SKIV2L			ADRA2B
				ADPRHL1			SLC7A5
				DIS3L2			FABP1
				ABHD17C			TRIM7
				ZNF292			AK4
				ZNF813			CDH16
				DROSHA			SORBS1
				EMC7			ETFDH
				ZNF696			SLC15A1
				HEG1			ZSWIM2
				RFXANK			LOC101928557

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				FAF2			PACSIN1
				TMEM41B			KREMEN1
				FAM149B1			IGK
				CEP95			KLK13
				ADA			GSPT2
				LAMC1			CYGB
				CLASP2			LIFR
				CLTC			CLECL1
				MAZ			CACNG8
				PIN4			C11orf94
				SRP9			DMBT1
				RSBN1L			LINC00664
				ZBTB8A			NUTM1
				PDCD10			MXI1
				SMYD2			CLCN5
				RPRD2			ODF3L1
				CHMP4B			SGCA
				MED30			MAGI2
				MKRN2			EXPH5
				ALKBH4			FLT3
				CCDC93			MTURN
				NXT1			MAP3K2
				GRAMD1A			MIR4300HG
				TROAP			C17orf64
				PRAMEF11			EVA1B
				TFG			IFNK
				SSNA1			LOC284632
				ELOVL4			PCDH19
				ANGPT1			ADORA1
				SNAPIN			ARHGAP27P1
				KARS			REEP5
				MED23			IL2
				RAN			LOC101929622
				LMTK2			LINC02060
				DGCR11			RPL23AP53
				CASKIN1			LOC100128164
				DUXAP10			FAM46A
				FAM131A			CDX4
				UFC1			HINT2
				EEF1A1			CYLC1
				PSMD14			PLD4
				KDM3B			GALNTL6
				FOXK1			VGLL2
				FBXO43			PLA2G15
				PDCD2			CYS1
				LIMK2			CDH1
				MRPL44			GRIN1
				ETF1			OR1A1
				MTPAP			KIAA1671
				RPF2			ANKFY1
				HHAT			CALML3
				NMRAL2P			CHRNA4
				UBE4A			TSPOAP1-AS1
				INTS3			LIMCH1
				C1orf109			FNDC5
				TRPM4			PCAT18
				CERNA1			LINC01563
				UBE2D1			JUNB
				LSM7			TNFSF13B
				HSP90AA1			PRSS50
				ICK			DENND3
				KIAA1614-AS1			LINC00280
				ANGPT2			ALDH8A1
				TRAPPC13			SLC18A2
				PARP1			WNT7A
				GPR89B			TSHZ3
				COPS7B			LRRRC74B
				BAG6			RHOB
				GZF1			GNPNAT1
				DDX55			XPA
				RPS15			MMAA
				FAM71C			FAIM2
				ZNF618			TBC1D10C
				DNAJC6			PRB1

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				C2CD5			LINC00491
				SLC35A4			ETHE1
				MAGEC2			R3HCC1
				GCNA			HADH
				TPD52			NEU4
				JAG2			GNMT
				PSMA4			INSL4
				ASB16-AS1			CACNG3
				ROCK1			RPAIN
				LOC401176			CAGE1
				CD34			PTGER4P2-CDK2AP2P2
				PHF5A			PPP4R1L
				MCTS1			DDN
				NCAPH			FNDC3A
				STK11IP			WNT10A
				ZNF45			SPIRE1
				ARPC2			ELOVL6
				ACYP1			TMEM71
				TK1			METRNL
				TAX1BP1			LOC100505711
				ZBTB42			MYL7
				LOC100132057			NCR1
				DPH5			MBD3L1
				INAVA			DLX3
				C10orf88			02-Mar
				CCNO			AP4S1
				HLA-F			PRTN3
				SAP30L			TPK1
				SELENOK			AVPR1A
				SMIM4			NPBWR1
				SEPT7-AS1			PPIF
				BRD9			COL14A1
				VEZF1			GJB2
				OGT			LRRC4B
				LSM11			ALOX12P2
				FAM13C			MICALCL
				SREK1IP1			CSAD
				PDGFRL			ATXN8OS
				PHIP			RECK
				RPIA			C10orf126
				AARS2			SLC22A25
				DENND5A			HECTD3
				MEN1			RAB3IL1
				HSPA13			FGF18
				FASTKD3			CD19
				IKBIP			BRSK2
				ANKRD16			CASC17
				RMI1			SCARB2
				COLCA2			SLC20A2
				RNF220			PRR18
				SHCBP1			OR10A3
				TRABD			CHIC2
				CLDN15			ATPAF1
				TAF6			PLA2G4F
				DOCK9			PCDH10
				TAF1A			ADK
				BRAP			TTC21A
				DPP3			FGFR1OP2
				SOC57			SLC9A1
				COMMD4			CHRND
				TUBB2A			TTY11
				RPL36			IGLN5
				MARCKS			NEXN
				SACS			ELSPBP1
				ASPM			FOXF1
				AGBL3			CA2
				TLL12			LTF
				RBCK1			RLN3
				SERPINH1			CTBS
				RFC2			ETS1
				TLE1			TNN
				PLXNA2			MPZL3
				DVL3			GATB
				KRIT1			PCDH8

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				PIAS2			KCNK15
				CD24			GSTA3
				TRAPPC12			HOXB6
				NSF			GPR146
				TBCC			SORD
				FAP			USP26
				GPR37			CD81
				SMURF1			LINC01654
				PRIM1			MYH7
				PRMT5-AS1			ZP4
				ANKRD39			SH2B3
				TNFSF4			WDFY3-AS2
				COP85			ST6GAL2
				TPM4			KIF1C
				CSTF2			SOX21-AS1
				SCPEP1			TMEM105
				MAPKAPK5			CRNN
				CDCA3			CABP2
				TFB2M			OR2B3
				METAP1D			FAM205C
				UGDH			ELF2
				GPR137C			PTS
				MAP2K5			SEMA3D
				NUP188			PRKACG
				SLC36A1			LOC100505942
				PLCB1			LOC101928813
				SRXN1			GLYAT
				RAI1			C16orf46
				LOXL2			KLHL40
				HTATSF1P2			DDC
				BPTF			LOC100507600
				KNL1			MMP17
				ATAD2			NXF3
				NPEPPS			ANPEP
				DENR			PROM1
				DDRK1			OR5I1
				XPNPEP1			LOC101928525
				PHF6			GDF5
				JKAMP			LOC729291
				MLLT6			LINC01348
				DNMT1			MROH9
				RNF26			WFDC11
				CDK5RAP1			LINC02140
				ZNF571			FGFR1OP
				WIPF2			SNHG10
				BRIP1			TBX20
				SMARCD2			LYPD5
				SBF2			RIPOR3
				PPM1B			INMT
				SUV39H1			GOLIM4
				PCF11			PADI2
				FOXRED2			SLC17A2
				CYP20A1			TONSL-AS1
				CAPRIN1			ZEB2
				ERV3-2			CYLD
				ATRAID			METTTL7A
				PEA15			THCAT158
				NDUFAF2			ABCG5
				ZNF23			DBIL5P2
				UQCC2			EIF4E3
				TBCA			CHRM2
				FMNL3			CAPN5
				LOC101928834			NR1H4
				FNBP4			RASL10A
				SNAP23			COX7A1
				STXBP6			01-Mar
				CBL			SSTR1
				MGA			RUSC2
				GPR4			SPPL2C
				ZDHHC9			PDE11A
				IL3RA			MRPS2
				TTC28			INPP5D
				TSEN2			TEX12
				YIPF1			LILRB5

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				GALK2			RILP
				CEP97			CFAP161
				ANKRD13C			TSPAN9
				MYO19			BRD7P3
				JMY			KCNRG
				KMT5B			LINC01718
				ZNF451			ARID4A
				RAB3B			ST6GALNAC6
				HES6			XAGE3
				FADD			CLYBL
				TBPL1			KCNC4
				ARRDC3			TSPAN1
				NIN			SPATS1
				PLCL1			ERVK3-2
				SRPK2			LECT2
				ABI1			NKAPL
				ZNF322			PCCA
				ALDH3A1			CNKSR1
				SLC1A4			FAM84A
				HOMER1			LOC654780
				ENY2			MGC12916
				ZNF302			TSSK4
				OSR1			MS4A7
				ITPA			OSBPL11
				CALU			MPDZ
				EMC4			CCL21
				PXDNL			PRKAR1B
				SAP18			FMO2
				HCG4			IL16
				SERPINB6			ITIH1
				LOC101928933			IPO11
				RWDD1			FAM189A1
				HIST1H2AK			SLC49A3
				ZKSCAN5			ZSWIM7
				PAXIP1-AS1			CCDC88C
				FIP1L1			MOGAT1
				SSH1			TXNDC11
				RALA			SLC13A5
				ENSA			ARC
				GMDS-DT			TMEM220
				RIBC2			LINC00671
				ZNF449			PPFIBP2
				CAD			PPP2R2D
				SAP30			SPART-AS1
				CKAP2			C6orf201
				CCNG1			LRRC3
				ZBTB9			SMTNL1
				MGME1			ATP6V1C2
				ZNF526			REL
				GNPTAB			OXNAD1
				ABCC10			GNA14
				PPP2R1A			FAM122C
				HNRNPM			DTX2P1-UPK3BP1-
							PMS2P11
				ARL14EP			LOC101927391
				SRSF1			01-Dec
				TMEM245			TM7SF3
				CNTNAP3			CPTP
				PTH2R			LOC101928731
				RPA1			CHRD
				RAB29			C19orf57
				TROVE2			KLC1
				HCP5B			LINC01541
				EEF1E1			PLLP
				GLUL			RGS6
				AUNIP			RNF144A-AS1
				ESF1			NCALD
				LAMTOR1			LMTK3
				MICB			MIF-AS1
				MDK			ZFYVE21
				ZNF346			AKAP13
				IAH1			USHBP1
				BFAR			OAF
				ZNF14			LINC02085

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				AIMP1			HHIP
				UBE2E1			DMRTC2
				O2-Mar			NHEG1
				DNAJC2			SLC45A3
				MICAL2			ETFBKMT
				GEMIN7			LINC01689
				UBA52			BTBD19
				RIPK1			ADH1B
				CPNE3			MEST
				HSPBP1			LOC100505782
				DNPB1			CYP2A7P1
				CALCRL			SPAG5-AS1
				ANKRD50			SARDH
				SIX4			WFDC3
				LOC100506302			CPA5
				EIF2A			MLANA
				JARID2			TMEM30A
				KIAA1549			CRK
				STK4			NCAPH2
				NCBP1			EPB41L4A-DT
				SSX1			KIAA0319
				HDAC2			SMPDL3B
				PRR7			PSG6
				LOC100996756			CLRN1-AS1
				ATP5PB			SLC39A11
				RANBP17			LY6E
				TIMMDC1			CAMKV
				MIR3916			S1PR5
				FGD1			PIP
				PIGS			LOC100631378
				MRPS27			COX6A2
				UBAP2L			PITPNM3
				TTYH2			PPP1R1C
				MLST8			SCNN1A
				PRR34-AS1			TYRO3P
				PRPF18			UNC13C
				SLF2			KCNE2
				MOB1A			TEDC1
				TMEM138			CCDC150
				TNIP2			TKFC
				RPL23AP32			CAB39L
				TMEM131			CFB
				SPC25			QSOX1
				STEAP2			HEMGN
				TMEM234			OR1J4
				WDHD1			LINC02218
				SLC30A6			FCN3
				KCNU1			PTPN3
				SDHAF4			ZNF488
				TMCO1			CXCL6
				PAPSS1			NPY2R
				TOGARAM1			SGSM2
				TRRAP			NOP14-AS1
				TRAF1			ART3
				GRN			TARP
				SLC45A4			LINC00437
				SCAMP1			CLEC4G
				TRIM32			SLC5A1
				SLX4IP			EPHB6
				AP3D1			SYT14
				ATP6V1G1			C16orf95
				NIPAL3			STAC
				EID3			MYO1G
				LOC101928988			KLHL17
				DDX54			TJP2
				NPR2			LILRA3
				KIF15			RAB27A
				PRLR			PAX3
				TRIP4			MCRIP2
				ZNF569			EFCAB13
				AP3S1			PNLIPRP1
				ZFYVE26			HSD17B8
				SNX3			YBX3
				NKAPD1			DEFB122

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				MINDY2			CACNA1G-AS1
				MED28			PPP1R3C
				PTPRA			SIK3
				STOML2			CPS1-IT1
				ADSL			LINC00642
				LAS1L			DLGAP2
				FTSJ1			SELENOO
				ZNF273			TAPT1
				BAP1			IRF8
				UBXN1			ZNF654
				CAB39			MICALL2
				FLAD1			CHRNA9
				RAB5C			SLC16A8
				TMEM161A			BMPR1B
				MSH2			CFHR3
				PIP4K2C			DUSP15
				NCKIPSD			PDE8B
				POLR2H			ABLIM3
				WTAP			MAP7D3
				UBE3D			C2orf42
				NECAB3			LTC4S
				GLDR			CALHM6
				MGAT4A			SMARCA2
				BUB1B			LRRC28
				ZNF180			CABLES1
				USF1			C2orf83
				NSA2			TTPAL
				SLC46A1			ADH6
				MTMR2			ADAMTS10
				DKK1			C1orf127
				STK35			PLAC4
				RRM1			SIGLEC11
				OLFML2B			DUSP16
				NDUFAF5			RAMP2
				PA2G4			FAM224A
				MAGEA1			GNG13
				C1orf35			F12
				NEDD8			STAC3
				CADM1			PDZD4
				NOTCH4			PI16
				RAD17			ZNF330
				NSRP1			CCDC198
				KLHL29			LINC01234
				TMEM17			LINC00934
				HJURP			VIPR1
				CTBP1-DT			DAW1
				THUMPD1			LOC284798
				THUMPD2			LINC01482
				ACIN1			PLAC8
				LINC01003			FZD1
				NMI			FREM1
				B4GALT7			PTK6
				CEP41			RIPOR2
				07-Sep			ALDOB
				SDHC			PTGS1
				RAMMET			DCC
				GNB5			C1orf94
				ATF6			SPAG7
				YLPM1			HOXD9
				GBF1			IGFBP4
				CCDC61			GUCA1A
				AAED1			PDSS2
				HAUS5			GABARAPL3
				TCF3			PLCH1-AS1
				SLF1			KCNK5
				HFE			TDRD1
				EIF2AK1			ARAF
				TMEM191A			CD69
				RAVER2			PLA2G2E
				SPATA5			TEX30
				B4GALT3			LTA
				MAP1B			CLEC4F
				NVL			MYOZ1
				ATAT1			IFNB1

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				GGNBP2			TSNAXIP1
				PLPPR2			LOC101928551
				BRWD3			FAM131B
				SSSCA1			PRR26
				CUL9			L1TD1
				ACTG2			NECTIN3-AS1
				ALG3			NMD3
				PCDHB3			ING1
				EWSR1			SLC2A9
				FAM124B			KLK11
				PDCD11			SMG7-AS1
				LLPH			TMED1
				EXOG			SALL3
				CYTH3			EMILIN3
				PLEKHA8			ETFRF1
				INTS4			CEBPB
				MLEC			GEM
				SRGAP3			TM6SF2
				EFCAB2			SLC14A1
				WDR41			CA1
				RNF121			UAP1
				ZNF337			KCNJ15
				C8orf76			PRKXP1
				OXSRI			DHODH
				RAD51			APBB1IP
				TSACC			RETSAT
				HTRA2			ATOH7
				CDK5			NRG1
				RBBP5			SYNPR-AS1
				ILKAP			ADGRG7
				PPFIA1			LGR4
				HMMR			SYT9
				CUL2			PRSS53
				BRPF3			SULT1B1
				RPS7			PGM3
				PSMD13			SLC4A11
				MORC4			ZGPAT
				DDX23			DHRS4-AS1
				ARFGEF1			C8orf34-AS1
				CDK19			DLEU1
				BTBD7			CISH
				AUP1			ZNF683
				MAD2L1BP			LOC105374768
				HNRNPA3			OGDHL
				CETN2			SPINT2
				NOLC1			CYP2J2
				IARS2			ADGRA3
				IDUA			RNF128
				RHOBTB3			TADA2B
				P2RX4			LOC101928961
				PPP2R3C			IL2RB
				COX11			SLCO4C1
				PDZK1			LRRD1
				CHERP			CD274
				UBIAD1			TEX101
				CYB561D1			LOC101928134
				FAM217B			GCNT1
				NPTN			CP
				TMEM258			SLC17A8
				SCAMP2			LINC00973
				SART3			GALNT16
				CAPN10			OLFML1
				ZNHIT3			CYP24A1
				SNRPD3			NPAS3
				PPP1R35			SLC35F4
				08-Mar			EVPLL
				GMNN			AHSP
				KRT10			COQ2
				LINC02241			TNS2
				CCT5			CTC1
				SPCS2			GHSR
				PEX19			MDH1B
				PRKAB1			KLRD1
				RALGAPA1			C17orf47

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				CNP			CCNYL2
				YAP1			HSPC324
				KIF20A			SCN5A
				CCDC121			WDR93
				RAD21			PDGFC
				TM2D1			PEPD
				SNRPB			CLIP1-AS1
				MIF			JCHAIN
				ELP1			WDR66
				ORC6			LINC00242
				ARL15			ZNF358
				ZNF253			LOC101059948
				ACD			ZPBP
				ZNF736			DACT1
				CEP152			C1orf68
				RHBDD3			PNPLA2
				PKD2L1			NPHP3-AS1
				TLCD1			HDAC6
				SF3B4			RFPL1
				NUDT5			KRT32
				RUSC1-AS1			FRG2EP
				PSMC3			HCLS1
				MIF4GD			VSTM1
				TUBGCP6			GPR15
				H2BFS			GHRH
				ARPIN			GRIP2
				MORN2			GDF3
				O2-Sep			OSBPL5
				ZNF791			CDHR2
				P4HB			GPLD1
				RBM27			POLR3B
				ALKBH8			TRDV3
				ZNF282			DLG3-AS1
				ZNF222			FAM166A
				CERS2			C12orf54
				ZNF788P			ADIPOQ
				PRDM15			
				STPG4			
				MFS5			
				BRF2			
				NUMA1			
				F11R			
				CPXCR1			
				GIPC1			
				PSMB1			
				TXN			
				ZNF30			
				ACTA2			
				FANCE			
				SP5			
				AGAP1			
				BECN1			
				TRPC4AP			
				GMPS			
				LINC00886			
				LGALS8			
				FKBP9			
				ATP6V1D			
				CARD19			
				LAMA4			
				ADPRHL2			
				EIF4G2			
				ZZZ3			
				ZNF112			
				ZNF436			
				C6orf47			
				SNRNP40			
				UBE3C			
				HOXC6			
				ZHX1-C8orf76			
				CTNNA2			
				ATE1			
				RNF13			
				ZNFX1			

(continued on next page)

Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				LOC105373942			
				SNRNP27			
				DCTN5			
				CEP44			
				MFSD14A			
				NORAD			
				SEPSECS-AS1			
				B3GALNT2			
				ANP32A-IT1			
				HKDC1			
				CLNS1A			
				PSME3			
				FUNDC2			
				DBR1			
				ZXDB			
				NME3			
				MGEA5			
				UBR7			
				BCAT1			
				PARD3B			
				CHN1			
				C18orf54			
				DNER			
				MAGEB1			
				LARP4B			
				MED22			
				CHAC2			
				RRNAD1			
				GATAD2B			
				ZNF398			
				METTL3			
				VPS13C			
				MALSU1			
				RTF2			
				HMGA1			
				CAPN7			
				REXO2			
				HMMR-AS1			
				ZSCAN22			
				CEP112			
				KDM3A			
				TULP3			
				ATP2A2			
				RPS14			
				ATIC			
				ONECUT2			
				LINC01224			
				STRN			
				TTK			
				UEVLD			
				ZNF557			
				DDX41			
				UBE2D2			
				GABARAPL2			
				DGCR2			
				TAOK1			
				UNC45A			
				VSIG10			
				GAPLINC			
				EXOC3-AS1			
				UBE2Q1			
				ZMYM6			
				C20orf204			
				HEATR3			
				GIT2			
				CASK			
				NCAPG			
				PXK			
				HSPG2			
				SMG9			
				ATP6V0E1			
				DKFZP58611420			
				TIFA			
				BAX			

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Table A1 (continued)

DEGs1	DEGs2	DEGs3	DEGs4	Genes merely downrelated in HCC	Genes merely uprelated in T2DM	Genes merely downrelated in T2DM	Genes merely uprelated in HCC
				FDPS			
				DUSP9			
				SLC52A2			
				RPL37			
				G6PC3			
				ZNF658			
				LRRC14			
				NANS			
				POC1B			
				FKBP1A			
				MSANTD2			
				SERTAD4-AS1			
				FCHO2			
				SMARCAL1			
				ANO6			
				RFTN2			
				ABCB8			
				FUNDC1			
				PRKCA			
				TRIB2			
				PRMT7			
				TTC1			
				HIPK1			
				MAD2L2			
				CLN3			
				LINC01943			
				STX4			
				TRIM8			
				NDRG3			
				RNF6			
				SMIM29			
				ECSCR			
				RUBCN			
				ANXA11			
				GRIA2			
				VDAC2			
				LMBR1			
				TMA7			
				RPS6KA3			
				NUSAP1			
				PHF21A			
				FAM49B			
				LANCL1			
				C15orf40			
				PPWD1			
				SNX21			
				DNAJC13			
				TRMU			
				BET1			
				USP3			
				VPS13B			
				SNX17			
				CIART			
				DCLRE1C			
				FTX			
				JOSD2			
				TTC30A			
				CYP2R1			
				C3orf67			
				XPO5			
				ZNF622			
				SLC2A11			
				SMCR8			
				LINC01004			
				ATP5MD			
				MMP9			
				EXOC6			
				DNAJC10			
				PIK3IP1			
				SLC39A6			
				SNRPD2			
				RPS27			

Abbreviations: DEGs, differential expressed genes; HCC, Hepatocellular carcinoma; T2DM, type 2 diabetes mellitus.

Table A2

Univariate and multivariate analysis of overall survival using the Cox proportional hazard regression model in 360 HCC patients.

Variables	Number	Univariate analysis		Multivariate analysis	
		HR (95% CI)	P	HR (95% CI)	P
Age					
> 60	187				
≤ 60	173	1.250 (0.881-1.774)	0.211		
Gender					
Male	243				
Female	117	0.823 (0.576-1.175)	0.283		
Race					
Asian	155				
White and others	195	1.337 (0.922-1.937)	0.126		
BMI					
> 25	153				
≤ 25	173	0.792 (0.543-1.154)	0.224		
AFP					
≤ 400	207				
> 400	63	1.072 (0.655-1.755)	0.782		
Grade					
1 + 2	224				
3 + 4	131	1.079 (0.751-1.552)	0.680		
Vascular tumor cells					
None	200				
Yes	104	1.387 (0.915-2.104)	0.124		
Stage					
I + II	248				
III + IV	88	2.421 (1.668-3.513)	< 0.001	2.353 (1.610-3.438)	< 0.001
CDNF					
Low	180				
High	180	0.934 (0.660-1.322)	0.700		
CRELD2					
Low	180				
High	180	1.316 (0.930-1.861)	0.121		
DNAJB11					
Low	180				
High	180	1.471 (1.038-2.084)	0.030		
DTL					
Low	180				
High	180	1.730 (1.218-2.457)	0.002	1.469 (1.003-2.151)	0.048
GINS2					
Low	180				
High	180	1.538 (1.086-2.179)	0.015		
MANF					
Low	180				
High	180	1.608 (1.130-2.286)	0.008	1.700 (1.163-2.487)	0.006
PDIA4					
Low	180				
High	180	1.128 (0.798-1.594)	0.496		
PDIA6					
Low	180				
High	180	1.571 (1.106-2.232)	0.012		
VCP					
Low	180				
High	180	1.328 (0.939-1.877)	0.108		

Abbreviations: CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homolog, subfamily B, member 11; DTL, denticleless E3 ubiquitin protein ligase homolog; GINS2, GINS complex subunit 2; HCC, hepatocellular carcinoma; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin containing protein. **Note:** Bold P refers to P < 0.05.

Table A3

Univariate and multivariate analysis of disease-free survival using the Cox proportional hazard regression model in 360 HCC patients.

Variables	Number	Univariate analysis		Multivariate analysis	
		HR (95% CI)	P	HR (95% CI)	P
Age					
> 60	187				
≤ 60	173	0.947 (0.705-1.274)	0.721		
Gender					
Male	243				
Female	117	1.031 (0.752-1.414)	0.849		
Race					
Asian	155				
White and others	195	1.271 (0.938-1.732)	0.122		
BMI					
> 25	153				
≤ 25	173	0.872 (0.639-1.190)	0.388		
AFP					
≤ 400	207				
> 400	63	1.046 (0.695-1.575)	0.829		
Grade					
1 + 2	224				
3 + 4	131	1.135 (0.835-1.543)	0.419		
Vascular tumor cells					
None	200				
Yes	104	1.592 (1.128-2.246)	0.008		
Stage					
I + II	248				
III + IV	88	2.407 (1.734-3.341)	< 0.001	2.324 (1.666-3.242)	< 0.001
CDNF					
Low	180				
High	180	1.034 (0.769-1.391)	0.823		
CRELD2					
Low	180				
High	180	1.354 (1.007-1.822)	0.045	1.382 (1.010-1.892)	0.043
DNAJB11					
Low	180				
High	180	1.151 (0.856-1.549)	0.351		
DTL					
Low	180				
High	180	1.689 (1.253-2.278)	0.001	1.513 (1.101-2.079)	0.011
GINS2					
Low	180				
High	180	1.637 (1.215-2.207)	0.001		
MANF					
Low	180				
High	180	1.089 (0.810-1.465)	0.573		
PDIA4					
Low	180				
High	180	1.061 (0.790-1.427)	0.693		
PDIA6					
Low	180				
High	180	1.161 (0.863-1.562)	0.324		
VCP					
Low	180				
High	180	1.134 (0.843-1.524)	0.406		

Abbreviations: CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DNAJB11, DnaJ (Hsp40) homolog, subfamily B, member 11; DTL, denticleless E3 ubiquitin protein ligase homolog; GINS2, GINS complex subunit 2; HCC, hepatocellular carcinoma; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; VCP, valosin containing protein. **Note:** Bold P refers to P < 0.05.

Table A4

Transcription factors of the nine hub genes predicted by the Gene Radar tool on the GCBI website.

CDNF	CRELD2	DNAJB11	DTL	GINS2	MANF	PDIA4	PDIA6	VCP
AML1	ALX1	AP2GAMMA	AP2GAMMA	BRN1	ALPHACP1	ACAAT	AHR	AHR
AML2	ALX3	BARHL1	AP3	BTEB2	BTEB2	AP2ALPHA	AHRHIF	AML1
BEN	ALX4	BARHL2	AP4	CDX1	CHCH	ARNT	AP2ALPHA	AML2
BRN1	AP2GAMMA	BCL6B	BRCA	CDX2	CPBP	BEN	AP2GAMMA	AP1
CDXA	ARX	BRN1	CPBP	CETS1	E2F3	BRN1	AP4	AP2REP
CHCH	CETS168	CDX1	E2F	CETS168	IK	CPBP	ARNT	AP4
CPBP	CPBP	CETS168	ESRRA	CETS1P54	ING4	E2F	BRN1	ATF1
CREB	DLX5	CHCH	ETS1	CETS2	KID3	E2F1	BTEB2	ATF6
DLX3	DRGX	CKROX	HELIOSA	COUPTF1	KLF7	EGR1	CACBINDINGPRO-TEIN	BEN
E2F	DRI1	CPBP	HNF4A	CPBP	KLF8	EHF	CACD	CJUN
EGR1	EVX2	E2A	HOXA13	DLX5	LKLF	ELF5	CDX2	CPBP
ERALPHA	FOXP3	E2F3	HSF4	DRI1	MOVOB	ELK1	CDXA	DMBX1
ERG	GABPA	EGR1	KAIISO	E2F	NR2C2	EP300	CHCH	DPRX
ETF	GKLF	EHF	KID3	E2F3	SOX17	ETF	CKROX	E2F
FEV	GR	ELF1	LHX2	E2F4	SP2	ETS	CLOCK	EGR3
FXR	GSX1	ELK1	NMYC	ELF	SP3	ETS2	CPBP	ELK1
HOXA11	GSX2	ETF	NR2C2	ELF1	SP1	FOXO1A	CPEB1	ERALPHA
HOXC10	HIF1A	ETS1	OC2	ELF2	SP6	GABPA	DLX2	ETF
KID3	HOXA13	FIGLA	P300	ELF4	WT1	GATA1	E2A	FOXO1A
KLF17	HOXA9	FKLF	PRRX2	ELK1	YB1	GEN	E2F	FRA1
LKLF	HOXB5	FOXA1	SOX10	ELK3		GR	E2F3	FXR
MAFA	HOXD3	FOXD2	SOX17	ELK4		HELIOSA	EGR1	GKLF
MAZ	IK	FOXD3	SPIB	ER71		ING4	EGR3	GLI
MTF1	KLF	FOXG1	STAT3	ER81		IRF7	EKLF	GLI3
MYOD	KLF3	FOXJ1	TCF1	ERF		KID3	ELF1	HEB
MYOD1	LHX2	FOXJ1	ZF5	ERG		LKLF	ELK1	HOXA7
MYOGENIN	LHX3	FOXJ2		ERM		MYCMAX	EP300	HSF4
NEUROD	LHX3A	FOXJ3		ETS1		NEUROD	ER71	HTF4
NURR1	LHX3b	FOKK1		ETV1		NR2C2	ESRRA	KID3
OC2	LHX4	FOXL1		ETV3		OC2	ETF	LBP1
PARP	LMX1A	FOXO1		ETV4		OCT1	ETS2	MITF
PLZFB	LMX1B	FOXO3		ETV5		P300	EVX1	MRF4
POU2F2	LRF	FOXO4		FEV		PEA3	EVX2	MYB
PRRX2	MAFB	FOXO6		FLI1		PEBP2B	FIZ1	MYOGENIN
RUSH1A	MIXL1	FOXP3		FOXC1		PITX2	FOXA1	MZF1
SATB1	MNX1	GKLF		FOXO1A		PR	FOXC1	NEUROD
SOX10	MSX2	HIC2		FXR		SMAD3	FOXO1	OTX2
SPIB	NRL	HNF3		GABPA		SOX18	FOXO1A	PARP
TBP	PDEF	ID4		GKLF		SOX4	FOXP3	PRDM1
TEF1	PMX1	IK		GR		SP1	GABPA	RFX4
YB1	PROP1	ING4		HNF3ALPHA		SP2	GATA	SMAD5
YY1	PRRX2	IRF7		HNF3G		SP3	GFI1B	SOX10
ZAC	RHOXF1	KID3		IK		SP4	GKLF	SOX18
ZBTB44	SALL2	KLF		IK2		SP6	HBP1	SPIB
ZEB1	SOX10	LKLF		ING4		SPIB	HDAC1	STAT1
ZFP536	SOX18	MEF2C		KID3		SREBP2	HFH2	TEF1
ZNF333	SOX30	MESP1		KLF		SRY	HIC1	TORC2
	SOX9	MYB		LKLF		TBX20	HIF1A	YB1
	SP2	MYOD1		LMX1		TBX5	HNF3G	ZAC
	SPIB	MYOGENIN		LRF		USF	HOXA10	ZBTB3
	UNCX	NFAT1		MAFA		WT1	HOXA13	ZBTB44
	WT1	NFAT4		MAZ		YB1	HOXA7	ZFP770
	ZFP516	NKX2B		MEF2C		ZF5	HOXA913	ZNF333
	ZFP532	NR1B2		MYB		ZFP74	HOXB5	ZXDA
	ZFP536	PARP		MZF1		ZNF569	HOXC10	ZXDB
	ZNF135	PRRX2		NERF			HOXC12	
		RPC155		NET			HOXD11	
		RXRA		NF1			HOXD12	
		PRRX2		NR1B2			HOXD3	
		RPC155		NUR77			HSF1	
		RXRA		OCT			HSF2	
		SALL2		OCT1			HSF4	
		SATB1		OSX			ING4	
		SMAD2		PEA3			IPF1	
		SNAP190		PET1			IRF1	
		SOX10		PITX2			KID3	
		SOX18		POU2F1			KLF	
		SPI1		POU2F2			KLF1	
		SPIB		POU4F3			KLF5	
		SPIC		PRRX2			LBP1	
		SREBP2		RHOX11			LFA1	
		T3RALPHA		RXRA			LKLF	
		TCF1		SALL1			LRF	
		TCF4		SALL2			LTF	

(continued on next page)

Table A4 (continued)

CDNF	CRELD2	DNAJB11	DTL	GIN52	MANF	PDIA4	PDIA6	VCP
		TEF1		SALL3			MAX	
		TFAP2A		SAP1A			MEF2C	
		TFAP2C		SATB1			MEOX2	
		TWIST		SIX1			MEQ	
		WT1		SMAD2			MITF	
		YB1		SMAD3			MOVOB	
		ZBTB44		SMAD4			MYB	
		ZFP536		SOX10			MYCMAX	
		ZN451		SOX17			MYOD	
		ZNF515		SOX18			MYOGENIN	
				SP1			MZF1	
				SP2			NET	
				SPI1			NEUROD	
				SPIB			NFAT1	
				SREBP2			NFAT3	
				SRY			NFAT4	
				TAF1			NKX2B	
				TCF1			NMYC	
				TCF3			NR1B2	
				TEL1			NR2F1	
				TWIST			NR4A2	
				WT1			OCT1	
				YY1			OSX	
				YY2			P300	
				ZAC			PAX4	
				ZBED6			PAX5	
				ZBTB44			PEA3	
				ZEB1			PITX2	
				ZNF181			PMX1	
				ZNF219			PRRX2	
							PUR1	
							RBPJK	
							RFX	
							RHOX11	
							RXRA	
							SALL2	
							SAP1A	
							SATB1	
							SMAD2	
							SMAD3	
							SMAD4	
							SOX10	
							SOX11	
							SOX18	
							SOX4	
							SP1	
							SP2	
							SP4	
							SPI1	
							SPIB	
							SREBP1	
							SREBP2	
							SRY	
							STAT3	
							TCF1	
							TCF3	
							TCF4	
							TEF1	
							TEL1	
							TFAP2A	
							TFAP2B	
							TFAP2C	
							TFE	
							TFIII	
							USF	
							WT1	
							YY1	
							YY2	
							ZBTB44	
							ZF5	
							ZFP536	
							ZFP64	
							ZNF717	
							ZXDA	
							ZXDB	

Table A5
The correlation of methylation sites of nine hub genes and overall survival in TCGA-LIHC.

Name	HR	CI	P.value	LR_test_pvalue	Best_split	UCSC_RefGene_Group	Relation_to_UC-SC_CpG_Island
CDNF							
cg05335277	0.879	(0.621;1.244)	0.466	0.467	mean	3'UTR	Open_Sea
cg25115135	1.234	(0.873;1.744)	0.234	0.232	median	Body	Island N_Shelf
CRELD2							
cg03363342	0.551	(0.387;0.785)	0.001	0.001	median	Body	N_Shore
cg04176532	0.932	(0.625;1.39)	0.732	0.733	q25	Body	Island
cg04800749	0.831	(0.559;1.235)	0.361	0.368	q25	3'UTR	N_Shore
cg07897659	1.220	(0.864;1.721)	0.258	0.257	median	Body	Island
cg22777249	1.349	(0.956;1.905)	0.089	0.088	median	Body	N_Shelf
cg26441486	1.042	(0.74;1.466)	0.815	0.815	median	Body	S_Shore
DNAJB11							
cg20906767	2.469	(1.499;4.066)	< 0.001	< 0.001	q25	3'UTR	Open_Sea
cg21631150	1.415	(0.915;2.189)	0.119	0.107	q25	Body	S_Shelf
DTL							
cg02280893	1.316	(0.903;1.916)	0.153	0.146	mean	3'UTR	Open_Sea
cg02900760	0.700	(0.496;0.989)	0.043	0.043	median	Body	Open_Sea
ch.1.4129519F	0.407	(0.267;0.622)	< 0.001	0.000	mean	Body	Open_Sea
GINS2							
cg00250524	1.284	(0.845;1.95)	0.241	0.231	q25	TSS200	Island
cg01355476	1.173	(0.783;1.757)	0.440	0.434	q25	Body	Island
cg01383486	0.802	(0.55;1.17)	0.253	0.260	mean	Body	N_Shore
cg02157667	0.916	(0.614;1.364)	0.664	0.667	q25	TSS200	Island
cg04402205	2.227	(1.404;3.531)	0.001	< 0.001	q25	5'UTR;1stExon	Island
cg05836725	0.594	(0.41;0.86)	0.006	0.008	q25	Body	N_Shelf
cg06061033	0.700	(0.493;0.993)	0.046	0.044	mean	TSS1500	Island
cg08830355	0.656	(0.464;0.929)	0.018	0.017	median	TSS200	Island
cg08871354	0.643	(0.454;0.912)	0.013	0.012	median	TSS1500	S_Shore
cg09917360	0.725	(0.514;1.022)	0.066	0.066	median	3'UTR	Open_Sea
cg19890739	0.685	(0.468;1.003)	0.052	0.059	q25	TSS1500	S_Shore
cg23871933	1.344	(0.95;1.9)	0.095	0.098	mean	Body	Island
cg26571870	1.332	(0.942;1.882)	0.104	0.103	median	TSS1500	S_Shore
cg27360527	1.604	(1.063;2.42)	0.024	0.019	q25	TSS200	Island
MANF							
cg01044394	1.120	(0.788;1.592)	0.526	0.528	mean	TSS1500	Island
cg02225143	0.694	(0.487;0.988)	0.043	0.040	mean	TSS1500	Island
cg02255184	1.365	(0.904;2.063)	0.139	0.128	q25	1stExon	Island
cg02264238	0.800	(0.547;1.171)	0.251	0.259	q25	Body	N_Shelf
cg04007931	0.835	(0.593;1.176)	0.303	0.302	median	TSS200	Island
cg07118985	1.089	(0.774;1.533)	0.623	0.623	median	Body	S_Shore
cg08058672	1.205	(0.842;1.726)	0.308	0.313	mean	Body	S_Shore
cg08667777	1.259	(0.814;1.949)	0.301	0.290	q25	TSS200	Island
cg10029076	1.681	(1.183;2.389)	0.004	0.005	mean	Body	S_Shore
cg15881088	1.295	(0.861;1.949)	0.215	0.205	q25	TSS1500	Island
cg18861151	1.234	(0.872;1.745)	0.235	0.234	median	TSS200	Island
cg20936475	2.058	(1.288;3.288)	0.003	0.001	q25	TSS200	Island
cg21034633	1.074	(0.713;1.618)	0.733	0.732	q25	Body	Island
cg24295551	2.352	(1.48;3.736)	< 0.001	< 0.001	q25	TSS200	Island
PDIA4							
cg00729039	1.422	(1.006;2.011)	0.046	0.045	median	Body	N_Shelf
cg02190873	0.664	(0.47;0.937)	0.020	0.019	median	TSS1500	S_Shore
cg02849913	2.153	(1.349;3.436)	0.001	< 0.001	q25	Body	Open_Sea
cg02892367	1.195	(0.787;1.815)	0.404	0.396	q25	Body	N_Shore
cg08113657	1.337	(0.943;1.897)	0.103	0.101	median	Body	Open_Sea
cg10128868	0.813	(0.559;1.182)	0.277	0.285	q25	1stExon	Island
cg10158711	1.737	(1.12;2.694)	0.014	0.009	q25	TSS200	Island
cg16693361	1.457	(0.958;2.215)	0.079	0.069	q25	TSS200	Island
cg20068463	1.265	(0.892;1.793)	0.187	0.191	mean	TSS200	Island
cg22234842	1.525	(0.998;2.33)	0.051	0.043	q25	TSS1500	Island
cg25041735	1.370	(0.886;2.12)	0.157	0.144	q25	3'UTR	Open_Sea
cg25326952	0.825	(0.558;1.22)	0.335	0.342	q25	Body	Open_Sea
cg25730717	2.134	(1.356;3.357)	0.001	< 0.001	q25	TSS1500	Island
cg25837738	1.518	(1.008;2.288)	0.046	0.039	q25	TSS200	Island
PDIA6							
cg01172315	1.282	(0.91;1.805)	0.155	0.157	mean	TSS200	Island
cg01930746	1.087	(0.772;1.53)	0.634	0.634	median	Body	N_Shore
cg02259698	1.866	(1.205;2.889)	0.005	0.003	q25	TSS1500	Island
cg02690256	0.873	(0.59;1.291)	0.496	0.501	q25	TSS1500	S_Shore
cg04351776	1.666	(1.173;2.366)	0.004	0.004	median	Body	N_Shore
cg06491548	0.618	(0.436;0.874)	0.007	0.006	median	Body	Open_Sea
cg10157359	0.851	(0.601;1.206)	0.364	0.363	median	TSS200	Island
cg10613252	0.848	(0.588;1.223)	0.378	0.383	q25	TSS200	Island
cg13809528	1.216	(0.79;1.87)	0.374	0.365	q25	Body	N_Shore

(continued on next page)

Table A5 (continued)

Name	HR	CI	P.value	LR_test_pvalue	Best_split	UCSC_RefGene_Group	Relation_to_UC-SC_CpG_Island
cg14465207	1.062	(0.753;1.497)	0.733	0.733	mean	Body	N_Shore
cg15705551	1.163	(0.783;1.727)	0.454	0.449	q25	TSS200	Island
cg17192681	0.688	(0.478;0.99)	0.044	0.041	mean	TSS200	Island
cg20725704	1.956	(1.246;3.071)	0.004	0.002	q25	Body	N_Shelf
cg20821314	1.086	(0.715;1.65)	0.700	0.698	q25	Body	N_Shore
cg22403851	0.808	(0.548;1.192)	0.282	0.290	q25	Body	Island
cg23809917	0.800	(0.567;1.13)	0.206	0.204	mean	TSS1500	Island
cg25436126	0.889	(0.632;1.251)	0.500	0.500	median	Body	Open_Sea
cg25617230	1.339	(0.95;1.888)	0.096	0.095	median	TSS200	Island
VCP							
cg01210520	0.785	(0.532;1.157)	0.221	0.230	q25	1stExon;5'-UTR	Island
cg10828210	0.560	(0.378;0.831)	0.004	0.003	mean	TSS1500	S_Shore
cg13538990	2.142	(1.456;3.152)	< 0.001	< 0.001	mean	TSS1500	S_Shore
cg13601161	1.905	(1.229;2.954)	0.004	0.002	q25	Body	Island
cg14515381	2.235	(1.398;3.572)	0.001	< 0.001	q25	TSS1500	S_Shore
cg15418155	0.937	(0.664;1.322)	0.711	0.710	median	TSS200	S_Shore
cg19401867	1.274	(0.904;1.796)	0.167	0.166	mean	TSS200	Island
cg19743759	2.246	(1.594;3.165)	< 0.001	< 0.001	mean	TSS200	Island

Abbreviation: CDNF, cerebral dopamine neurotrophic factor; CRELD2, cysteine-rich with EGF-like domains 2; DTL, denticleless E3 ubiquitin protein ligase homolog; GINS2, GINS complex subunit 2; LR_test, log-rank test; MANF, mesencephalic astrocyte-derived neurotrophic factor; PDIA4, protein disulfide isomerase family A, member 4; PDIA6, protein disulfide isomerase family A, member 6; TCGA-LIHC, The Cancer Genome Atlas-liver hepatocellular carcinoma dataset. **Note:** Bold P refers to $P < 0.05$.

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