

Original Article

Genetically predicted high circulating insulin-like growth factor-1 and insulin-like growth factor binding protein-3 increase the risks of soft tissue sarcoma

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Received February 8, 2021; Accepted April 13, 2021; Epub August 15, 2021; Published August 30, 2021

Abstract: Insulin growth factor-1 (IGF-1) plays important roles in carcinogenesis. Previous studies have linked circulating IGF-1 and its main binding protein, insulin-like growth factor-binding protein-3 (IGFBP-3), to cancer risks. However, no study has been conducted in soft tissue sarcoma (STS). In this study, we investigated the relationship of genetically predicted circulating IGF-1 and IGFBP-3 with STS risks. Recent large genome-wide association studies (GWAS) have identified 413 single nucleotide polymorphisms (SNPs) associated with IGF-1 and 4 SNPs associated with IGFBP-3. We genotyped these SNPs in 821 patients and 851 healthy controls. We constructed weighted genetic risk scores (GRS) to predict circulating IGF-1 and IGFBP-3. We determined the associations of individual SNPs and GRS with the risks of STS using multivariate logistic regression analysis. We found high genetically predicted circulating IGF-1 and IGFBP-3 were both associated with increased STS risks. Dichotomized at the median values of IGF-1 and IGFBP-3 in controls, individuals with high level of IGF-1 exhibited a 27% increased risk of STS (odds ratio [OR]=1.27, 95% confidence interval [CI]=1.04-1.54, P=0.017), whereas the OR for high IGFBP-3 was 1.45 (95% CI=1.20-1.77, P<0.001). Interestingly, the significant association between IGFBP-3 and STS risk was only evident in women (OR=1.88, 95% CI=1.42-2.49, P<0.001), but not in men (OR=1.00, 95% CI=0.75-1.33, P=0.992). In stratified analyses by major STS subtypes, the strongest associations were observed in angiosarcoma for IGF-1, leiomyosarcoma for IGFBP-3, and gastrointestinal stromal tumors for IGFBP-3 in women. In conclusion, high circulating IGF-1 and IGFBP-3 levels were both associated with increased STS risks.

Keywords: Soft tissue sarcoma, IGF-1, IGFBP-3, SNP, genetic risk score

Introduction

Sarcoma is a group of heterogeneous malignancies derived from mesenchymal cells [1, 2]. Sarcoma can be broadly classified into soft tissue sarcoma (STS) and bone sarcoma. There are an estimated 13,460 and 3,610 new STS and bone sarcoma cases, respectively, in the U.S. in 2021 [3]. STS develops in tissues that support or connect other organs and tissues, such as muscles, fat, blood vessels and nerves, and can form in any part of the body, but more often in extremities (particularly in thigh) [4]. The median age of STS at diagnosis is 60 years [5]. Most STS cases are believed to de-

rive sporadically, and their etiology remains largely unknown. The only established environmental exposure risk factor for STS is ionizing radiation. For instance, atomic bomb survivors and radiotherapy-treated cancer patients are at significantly increased risks of STS [6-9]. However, radiation exposure only explains approximately 3% of all STS cases [10]. Certain viruses have been associated with increased risks of specific rare subtypes of STS under the circumstances of immunosuppression. For example, human herpesvirus 8 (HHV-8) conferred an increased risk of Kaposi sarcoma in HIV patients [11]. The genetic basis of STS is not well understood. Less than 3% of STS ca-

ses are linked to inherited genetic syndromes [10]. A few inherited genetic syndromes, such as Li-Fraumeni syndrome (LFS), retinoblastoma (RB), and neurofibromatosis type 1 (NF1), confer increased STS risks [1, 2]. Sarcomas represented 25% of TP53 mutation carriers' tumors, and STS is the second most common cancer in LFS patients [12, 13]. Approximately 8% of hereditary RB survivors eventually develop STS [14]. A most recent study using 219 STS cases from The Cancer Genome Atlas (TCGA) and over 3500 controls found rare pathogenic variants in NF1, TP53, RB1, MSH2, and BAG1 genes confer increased risks of multiple STS subtypes [15]. No common single nucleotide polymorphism (SNP) was confirmed as STS susceptibility locus by genome-wide association study (GWAS) because the disease is rare and there are not enough cases for GWAS. However, candidate gene studies have suggested a few potential STS susceptibility SNPs [16, 17].

IGF-1, as key regulators of energy metabolism, play important roles in cancer development and progression [18, 19]. IGF-1 is primarily secreted by the liver and expressed in almost every human tissues, acting through endocrine, autocrine, and paracrine mechanisms to regulate cell growth, differentiation, and apoptosis [18-20]. In bloodstream and local tissues, 99% of IGF-1 proteins are bound by IGF-binding protein (IGFBP) family proteins, among which IGFBP-3 is the most abundant that binds to approximately 80% of IGF-1 [20, 21]. Binding to IGFBP-3 blocks the binding of IGF-1 to its receptor, IGF-1R, thus IGFBP-3 acts as an antagonist of IGF-1. Because of the pro-growth and anti-apoptotic effect of IGF-1, there has been great interest in assessing the link of circulating IGF-1 and IGFBP-3 to cancer risks [22-31]. Recent extensive prospective studies from the UK Biobank found higher serum IGF-1 concentration was associated with increased risks of thyroid, colorectal, breast, and prostate cancer, and reduced risks of ovarian and liver cancer [30, 31]. Moreover, several recent studies have used genetic variants as instruments to predict circulating IGF-1 and IGFBP-3 concentrations and evaluated the associations of genetically predicted circulating IGF-1 and IGFBP-3 with cancer risks, an approach named Mendelian randomization (MR) [32-35]. Consistent with the results of serological measurements of circulating IGF-1 in prospective cohort studies, high genetically

predicted circulating IGF-1 was associated with increased risks of breast, prostate, and colorectal cancers [32-35]. The associations of IGFBP-3 with cancer risks are less consistent with data mostly obtained from retrospective or nested case-control studies [24-29, 33, 34]. Two recent Mendelian randomization studies using UK Biobank data reported high genetically predicted circulating IGFBP-3 level was associated with an increased risk of colorectal cancer, but not breast cancer [33, 34].

To date, there has been no study evaluating the associations of circulating IGF-1 and IGFBP-3 with STS risks. In this study, we constructed genetic risk scores (GRS) to predict circulating IGF-1 and IGFBP-3 using a large panel of SNPs identified from GWAS. We then evaluated the associations of the predictive GRS of circulating IGF-1 and IGFBP-3 with the risks of STS.

Material and methods

Study population

All the STS patients in this study were recruited from The University of Texas MD Anderson Cancer Center. Patients were histologically confirmed. The basic epidemiological information was extracted from a questionnaire that all newly registered patients filled at MD Anderson Cancer Center. Healthy controls without prior history of any cancer were recruited from Kelsey-Seybold Clinics, the largest multispecialty physician group in the Houston area. Controls were matched to the cases by age, gender, and race. Due to the rarity of minority cases, only participants of European ancestry were included in the analyses. Epidemiological information of controls was obtained by personal interview.

Genotyping and imputation

Genotyping and imputation were done as we previously described [17]. We included 2% randomly selected replicated samples in genotyping and the mean concordance rate of genotypes was 99.2%. All the samples had an overall SNP call rate of 95% or greater. We used the online service of Michigan Imputation Server (<https://imputationserver.sph.umich.edu/>) for genotype imputation [36]. The imputation accuracy (mean R^2) was 0.96. Large GWAS has identified 413 SNPs associated with circulating IGF-1 and 4 SNPs with IGFBP-3 ([Table S1](#)) [33,

Table 1. Selected characteristics of the study population

Characteristics	Cases N=821	Controls N=851	P value
Age, years (mean, SD)	56.4 (11.6)	57.00 (8.6)	0.22
Gender, N (%)			
Male	388 (47.3)	406 (47.7)	
Female	433 (52.7)	445 (52.3)	0.85
Histology, N (%)			
LEIOMYOSARCOMA	272 (33.1)		
GIST*	220 (26.8)		
LIPOSARCOMA	181 (22.0)		
ANGIOSARCOMA	60 (7.3)		
Other subtypes	88 (10.7)		

*GIST: gastrointestinal stromal tumors.

Table 2. Associations of genetically predicted IGF1 and IGFBP-3 with STS risks

GRS	Control N (%)	Case N (%)	OR* (95% CI)	P value
IGF-1				
Low	413 (53.29)	362 (46.71)	1 (reference)	
High	413 (47.36)	459 (52.64)	1.27 (1.04-1.54)	0.017
IGFBP-3				
Low	433 (54.95)	355 (45.05)	1 (reference)	
High	393 (45.75)	466 (54.25)	1.45 (1.20-1.77)	<0.001

*Adjusted by age and gender.

34, 37, 38]. We used these 413 and 4 SNPs to construct GRS for IGF-1 and IGFBP-3, respectively.

Weighted GRS and MR analysis

We used a two-sample Mendelian randomization (MR) design to evaluate the associations of genetically predicted circulating IGF-1 and IGFBP-3 with STS risks. The effect coefficient (β estimate) for SNP-IGF-1 and SNP-IGFBP-3 association were derived from published GWAS [33, 34, 37, 38]. The weighted GRS was calculated using 413 IGF-1 and four IGFBP-3 associated SNPs, respectively, according to the following formula.

$$GRS_i = \sum_{j=1}^N w_j x_{ij}$$

In which GRS_i is the risk score for individual i . x_{ij} ($x_{ij}=0,1$ or 2) is the number of alleles conferring increasing IGF-1 or IGFBP-3 level for the j -th SNP, and w_j is the β estimate for each SNP. "N" equals 413 for IGF-1 and 4 for IGFBP-3. A higher GRS value represents higher genetically predicted IGF-1 or IGFBP-3.

Statistical analysis

The allele frequencies of each SNP were compared between cases and controls by the χ^2 test or Fisher's exact test. Multivariate logistic regression model was used to evaluate the associations of each SNP and GRS with STS risk adjusting for age and gender. Individuals were dichotomized into two groups (low and high GRS) using the median GRS value in controls as the cutoff point. Odds ratio (OR) and 95% confidence interval (95% CI) were calculated by multivariate logistic regression model using low GRS group as the reference group. All P values were two-sided with $P<0.05$ considered statistically significant.

Results

Characteristics of study population

Table 1 describes the selected characteristics of the study population. The cases and controls were frequency-matched on age and gender.

All subjects were of European descent. The mean age at diagnosis was 56.4 (SD: 11.6) years for patients and the mean age for controls at recruitment was 57.0 (SD: 8.6) years. Leiomyosarcoma accounted for about one third (33.1%) of the cases, followed by gastrointestinal stromal tumors (26.8%) and liposarcoma (22.0%).

Association between Individual SNPs, GRS and STS risk

Individual SNP analyses revealed that a few SNPs were nominally associated with the risks of STS, including 14 IGF-1-associated and one IGFBP-3-associated SNPs (rs11977526 in IGFBP-3 genomic region, OR=1.19, 95% CI, 1.03-1.37, P=0.018) (Table S1). None of these associations remained significant after multiple testing correction by Bonferroni test.

We next calculated weighted GRS using the 413 SNPs for IGF-1 and four SNPs for IGFBP-3, respectively, and determined the associations of the GRS with STS risks using multivariable logistic regression analysis (Table 2). We di-

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Table 3. Associations of genetically predicted IGF-1 and IGFBP-3 with the risks of STS in men and women

GRS	Control N (%)	Case N (%)	OR* (95% CI)	P value
IGF-1				
Men				
Low	189 (52.79)	169 (47.21)	1 (reference)	
High	217 (49.77)	219 (50.23)	1.24 (0.93-1.66)	0.146
Women				
Low	224 (53.72)	193 (46.28)	1 (reference)	
High	196 (44.95)	240 (55.05)	1.37 (1.04-1.80)	0.026
IGFBP-3				
Men				
Low	178 (51.30)	169 (48.70)	1 (reference)	
High	228 (51.01)	219 (48.99)	1.00 (0.75-1.33)	0.992
Women				
Low	255 (57.82)	186 (42.18)	1 (reference)	
High	165 (40.05)	247 (59.95)	1.88 (1.42-2.49)	<0.001

*Adjusted by age.

Table 4. Associations of genetically predicted IGF-1 and IGFBP-3 with the risks of major STS subtypes

GRS	Control N (%)	Case N (%)	OR* (95% CI)	P value
IGF-1				
Leiomyosarcoma				
Low	413 (76.77)	125 (23.23)	1 (reference)	
High	413 (73.75)	147 (26.25)	1.22 (0.92-1.62)	0.175
GIST				
Low	413 (81.94)	91 (18.06)	1 (reference)	
High	413 (76.20)	129 (23.80)	1.42 (1.05-1.91)	0.024
Liposarcoma				
Low	413 (84.11)	78 (15.89)	1 (reference)	
High	413 (80.04)	103 (19.96)	1.28 (0.92-1.77)	0.142
Angiosarcoma				
Low	413 (95.16)	21 (4.84)	1 (reference)	
High	413 (91.37)	39 (8.63)	1.86 (1.07-3.22)	0.028
IGFBP-3				
Leiomyosarcoma				
Low	433 (79.01)	115 (20.99)	1 (reference)	
High	393 (71.45)	157 (28.55)	1.72 (1.29-2.31)	<0.001
GIST				
Low	433 (81.70)	97 (18.30)	1 (reference)	
High	393 (76.16)	123 (23.84)	1.39 (1.03-1.89)	0.032
Liposarcoma				
Low	433 (83.75)	84 (16.25)	1 (reference)	
High	393 (80.20)	97 (19.80)	1.16 (0.83-1.62)	0.374
Angiosarcoma				
Low	433 (94.13)	27 (5.87)	1 (reference)	
High	393 (92.25)	33 (7.75)	1.34 (0.78-2.30)	0.288

*Adjusted by age and gender.

chotomized individuals into high and low GRS groups using the median GRS value in controls as the cutoff. For both IGF-1 and IGFBP-3, individuals with high GRS, i.e., high genetically predicted circulating IGF-1 and IGFBP-3 levels, were at significantly increased risks of developing STS with ORs of 1.27 (95% CI, 1.04-1.54, P=0.017) and 1.45 (95% CI, 1.20-1.77, P<0.001), respectively (**Table 2**), compared to individuals with low genetically predicted circulating levels. In stratified analysis by gender, the association was slightly higher in women (OR=1.37, 95% CI, 1.04-1.80, P=0.026) compared to men (OR=1.24, 95% CI, 0.93-1.66, P=0.146) for IGF-1. However, for IGFBP-3, the association was much stronger in women (OR=1.88, 95% CI, 1.42-2.49, P<0.001) than in men (OR=1.00, 95% CI, 0.75-1.33, P=0.992) (**Table 3**).

Stratified analyses by histology

We then analyzed the associations of genetically predicted IGF-1 and IGFBP-3 with specific histologic subtypes (**Table 4**). For IGF-1, the highest risk estimate was in angiosarcoma (OR=1.86, 95% CI, 1.07-3.22, P=0.028); whereas for IGFBP-3, the highest risk estimate was in leiomyosarcoma (OR=1.72, 95% CI, 1.29-2.31, P<0.001). The associations were significant in GIST for both IGF-1 (OR=1.42, 95% CI, 1.05-1.91, P=0.024) and IGFBP-3 (OR=1.39, 95% CI, 1.03-1.89, P=0.032). The other associations did not

reach statistical significance, but all in the same direction with high genetically predicted IGF-1 and IGFBP-3 conferring increased risks of STS subtypes.

We further performed stratified analyses by gender in the top three histologic subtypes (**Table 5**). Because angiosarcoma only had 60 cases, we did not further stratify by gender. For leiomyosarcoma, the associations with IGFBP-3 were significant in both men (OR=1.85, 95% CI, 1.04-3.28, P=0.035) and women (OR=1.61, 95% CI, 1.14-2.27, P=0.007). Since Uterine leiomyosarcoma accounted for over half of all female leiomyosarcoma, we performed specific analysis on uterine leiomyosarcoma and found a similar risk estimate (OR=1.68, 95% CI, 1.09-2.61, P=0.020). On the other hand, the association of IGFBP-3 with GIST risk was much stronger in women (OR=2.69, 95% CI, 1.69-4.27, P<0.0001) than in men (OR=0.69, 95% CI, 0.45-1.05, P=0.082) (**Table 5**), which apparently was the major driving force for the specific association between IGFBP-3 and STS risk in women but not in men (**Table 2**).

Discussion

To our knowledge, this is the first study to investigate the associations of circulating IGF-1 and IGFBP-3 with the risks of STS. We found significant positive associations between genetically predicted IGF-1 and IGFBP-3 levels and the risks of STS.

The link between the insulin/IGF axis and neoplasm has been established for decades with substantial compelling evidence [18, 19]. These include the mitogenic activity of insulin and IGF, the sequence homology of insulin receptor and IGF1R to oncogenes of tyrosine kinase class, the growth-stimulating effect of IGF on cancer cells, overexpression of IGF1R in human cancer cells, the therapeutic efficacy of IGF1R antibody in animal models and clinical trials, and the significant association between circulating IGF-1 and elevated cancer risks in epidemiological studies [18, 19]. IGF-1 binds to IGF-1R, a tyrosine kinase, resulting in the activation of downstream cascades of kinases such as PI3K-Akt and Ras-MAPK signaling pathways [18].

Although earlier case control studies produced inconsistent results, recent large, prospective

cohort studies, have demonstrated a positive association between IGF-1 and risk of developing certain cancers. For instance, the UK Biobank of approximately 400 K participants with baseline serological IGF-1 measurements and prospective follow-up data of cancer incidences, clearly demonstrated that high baseline circulating IGF-1 is associated with significantly increased risks of developing multiple cancers, including breast, prostate, colorectum and thyroid cancer and melanoma [30-34]. Most other rare cancers also exhibited a similar trend of elevated risks of cancer development associated with high baseline circulating IGF-1. However, the association did not reach statistical significance due to the small numbers of cases [30, 31]. Recent MR studies, again using UK Biobank data, confirmed the significant associations of high genetically predicted circulating IGF-1 with increased risks of breast, prostate, and colorectal cancers [32-34]. None of the previous studies included STS in their analyses, likely due to this cancer's rarity and the small number of cases. For the first time, our data found a positive association between genetically predicted high circulating IGF-1 and increased risk of STS, consistent with the observations in other cancers.

The associations between circulating IGFBP-3 and cancer risks have been much less consistent than those of IGF-1 [24-29]. To our knowledge, all the published studies evaluating the association of plasma/serum IGFBP-3 and cancer risks are retrospective or nested case-control studies [24-29]. Further, no large prospective cohorts have evaluated serological IGFBP-3 levels. The reasons for the inconsistent results include modest sample sizes, different study populations, measurement variability in serum/plasma IGFBP-3, and reverse causality in case-control studies. Recently, two large MR studies analyzed the associations of genetically predicted IGFBP-3 with the risks of breast and colorectal cancer and found high genetically predicted circulating IGFBP-3 was associated with an increased risk of colorectal cancer (OR=1.12; 95% CI 1.06-1.18; P=4.2 × 10⁻⁵), but not breast cancer (OR=1.00, 95% CI=0.97-1.04; P=0.98)[33,34]. The association of genetically predicted IGFBP-3 with colorectal cancer was largely driven by SNP rs11977526 in *IGFBP-3* genomic region [33]. Our results are consistent with this large colorectal cancer MR

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Table 5. Associations of genetically predicted IGF-1 and IGFBP-3 with the risks of major STS subtypes in men and women

GRS	Control, N (%)	Case, N (%)	OR* (95% CI)	P value
IGF-1				
Leiomyosarcoma				
Men				
Low	189 (86.70)	29 (13.30)	1 (reference)	
High	217 (84.77)	39 (15.23)	1.39 (0.81-2.40)	0.234
Women				
Low	224 (70.00)	96 (30.00)	1 (reference)	
High	196 (64.47)	108 (35.53)	1.21 (0.86-1.70)	0.282
Uterine Leiomyosarcoma				
Low	224 (80.87)	53 (19.13)	1 (reference)	
High	196 (77.17)	58 (22.83)	1.10 (0.71-1.70)	0.668
GIST				
Men				
Low	189 (79.41)	49 (20.59)	1 (reference)	
High	217 (76.14)	68 (23.86)	1.32 (0.87-2.04)	0.192
Women				
Low	224 (84.21)	42 (15.79)	1 (reference)	
High	196 (76.26)	61 (23.74)	1.56 (1.00-2.43)	0.048
Liposarcoma				
Men				
Low	189 (77.78)	54 (22.22)	1 (reference)	
High	217 (76.68)	66 (23.32)	1.08 (0.71-1.63)	0.734
Women				
Low	224 (90.32)	24 (9.68)	1 (reference)	
High	196 (84.12)	37 (15.88)	1.55 (0.88-2.72)	0.127
IGFBP-3				
Leiomyosarcoma				
Men				
Low	178 (89.45)	21 (10.55)	1 (reference)	
High	228 (82.91)	47 (17.09)	1.85 (1.04-3.28)	0.035
Women				
Low	255 (73.07)	94 (26.93)	1 (reference)	
High	165 (60.00)	110 (40.00)	1.61 (1.14-2.27)	0.007
Uterine Leiomyosarcoma				
Low	255 (84.16)	48 (15.84)	1 (reference)	
High	165 (72.37)	63 (27.63)		
GIST				
Men				
Low	178 (74.17)	62 (25.83)	1 (reference)	
High	228 (80.57)	55 (19.43)	0.69 (0.45-1.05)	0.082
Women				
Low	255 (87.93)	35 (12.07)	1 (reference)	
High	165 (70.82)	68 (29.18)	2.69 (1.69-4.27)	<0.0001
Liposarcoma				
Men				
Low	178 (75.74)	57 (24.26)	1 (reference)	
High	228 (78.35)	63 (21.65)	0.92 (0.61-1.40)	0.707
Women				
Low	255 (90.43)	27 (9.57)	1 (reference)	
High	165 (82.91)	34 (17.09)	1.48 (0.84-2.61)	0.172

*Adjusted by age.

study. We found a positive association between genetically predicted IGFBP-3 and STS risk, and this association was primarily driven by rs11977526. The positive associations between circulating IGFBP-3 and cancer risks in these studies appear counterintuitive since IGFBP-3 functions to counteract and block IGF-1 function. Nevertheless, the functions of IGFBP-3 in cancer are complex and may be bidirectional with both stimulatory and inhibitory effects on cancer development and progression depending on cellular context. It might be anti-proliferative and pro-apoptotic through IGF-1 or IGF-1-independent pathways [39], but it could also be pro-proliferative, anti-apoptotic, and favoring tumor growth, as supported by many publications. For example, IGFBP-3 promoted *in vitro* breast cancer cell growth when the cells are grown on fibronectin [40]. IGFBP-3 secreted from mammary tumor cells and stromal cells exhibited contrasting effects on breast cancer progression in animal models [41]. In a lung cancer mouse model, IGFBP-3 showed a differential impact on tumor growth, either inhibiting or potentiating IGF-1 actions depending on its expression level [42]. IGFBP-3 promoted the migration, invasion, and/or metastasis of oral [43], esophageal [44], lung [45], and colorectal [46] cancer cells. The functional impact of IGFBP-3 on STS cells remains to be studied. Another possible explanation for the positive association between IGFBP-3 and STS risk may be related to the strong effect of rs11977526. This SNP is also associated with circulating IGF-2 [47]. IGF-2 is an imprinted gene. Loss of imprinting (LOI) and resulting increased expression of IGF-2 are known to drive colorectal carcinogenesis [48, 49]. Interestingly, IGF2 is highly expressed in STS tumors [50-52] and LOI of IGF2 occurs to most types of STS [51, 52]. In fact, in a panel of tumors, IGF2 expression levels were consistently elevated only in two types, colon carcinoma and STS [53], making colon cancer and STS two of the prototypes of LOI among all cancer types. The consistent results of positive associations of rs11977526 and genetically predicted IGFBP-3 with the risks of colorectal cancer [33] and STS in our current study may therefore be related to IGF2. No GWAS of IGF2 has been performed and rs11977526 is the only established IGF2-associated SNP. In the future, more precise genetic instruments are needed to decipher

the biological effects of different IGF ligands and binding proteins on STS etiology.

In conclusion, this is the first study to determine the associations of circulating IGF-1 and IGFBP-3 with STS risks. We found genetically predicted high levels of circulating IGF-1 and IGFBP-3 are strongly associated with increased risks of STS. Future studies are needed to validate our results using an MR approach in independent populations with large number of STS cases and using serological measurements of IGF-1 and IGFBP-3 in large prospective cohorts such as UK Biobank.

Acknowledgements

This study was supported by MD Anderson Cancer Center start-up fund to Dr. Jian Gu.

Disclosure of conflict of interest

None.

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Table S1. Individual IGF-1- and IGF-BP3-associated SNPs and STS risks

SNP ID	Chr.	Position	Gene	Allele*	β^*	MAF*		OR** (95% CI)	P value
						Cases	Controls		
IGF-1 SNPs									
rs12593755	15	89111712	AC013489.2	G/T	-0.016	0.408	0.401	1.03 (0.89-1.18)	0.714
rs7719168	5	53292390	ARL15	A/C	-0.03	0.109	0.118	0.92 (0.75-1.15)	0.477
rs6827641	4	145653694	GYPA/HHIP	C/T	-0.014	0.450	0.467	0.93 (0.81-1.07)	0.331
rs8017377	14	24883887	NYNRIN	A/G	-0.017	0.538	0.554	0.93 (0.81-1.07)	0.334
rs17145738	7	72982874	TBL2	C/T	-0.034	0.122	0.118	1.03 (0.83-1.26)	0.812
rs117564283	12	52300110	ACVRL1	C/T	-0.029	0.061	0.058	1.06 (0.79-1.41)	0.704
rs116971887	16	51170026	SALL1	G/T	0.036	0.040	0.039	1.03 (0.72-1.47)	0.883
rs45505697	1	153651058	NPR1	C/A	0.03	0.012	0.011	1.07 (0.53-2.19)	0.846
rs72758321	5	41464841	PLCXD3	A/G	-0.047	0.016	0.018	0.85 (0.48-1.49)	0.567
rs7323205	13	110365525	LINC00676	C/T	0.015	0.385	0.390	0.98 (0.85-1.13)	0.781
rs12520263	5	44122508	RNU6-381P	G/T	-0.017	0.273	0.277	0.98 (0.84-1.14)	0.825
rs118081390	13	49671053	FNDC3A	G/A	0.028	0.054	0.042	1.30 (0.93-1.81)	0.121
rs17393144	1	9210262	MIR34A	G/A	-0.016	0.295	0.296	1.00 (0.86-1.16)	0.971
rs4988483	16	1129010	SSTR5	A/C	-0.172	0.994	0.996	0.67 (0.21-2.13)	0.497
rs10851736	15	64940718	ZNF609	C/T	-0.027	0.088	0.085	1.04 (0.81-1.33)	0.755
rs11012712	10	21760015	-	C/T	0.022	0.184	0.178	1.04 (0.87-1.25)	0.651
rs1986692	7	133743393	EXOC4	A/G	-0.015	0.387	0.402	0.94 (0.81-1.09)	0.408
rs10892564	11	120224650	ARHGEF12	A/G	-0.017	0.376	0.384	0.97 (0.84-1.11)	0.652
rs2819336	1	44015809	PTPRF	C/T	-0.027	0.354	0.352	1.01 (0.88-1.17)	0.884
rs2786185	6	147595554	STXBP5	G/A	0.019	0.462	0.460	1.00 (0.87-1.15)	0.988
rs10246481	7	156184748	lincRNA	A/G	-0.015	0.398	0.401	0.99 (0.86-1.14)	0.860
rs11678946	2	222302730	EPHA4	C/A	-0.014	0.494	0.480	1.06 (0.92-1.23)	0.420
rs11230983	11	55541284	OR5D13	A/G	0.035	0.883	0.869	1.14 (0.92-1.40)	0.226
rs329122	5	133864599	JADE2	G/A	-0.018	0.417	0.429	0.95 (0.82-1.09)	0.463
rs10136874	14	101202022	DLK1	G/T	0.023	0.506	0.496	1.04 (0.91-1.20)	0.567
rs12442867	15	62489128	AC126323.2	C/A	-0.017	0.417	0.440	0.91 (0.79-1.05)	0.199
rs2424396	20	21630280	LINC01726	A/G	-0.033	0.064	0.070	0.91 (0.69-1.21)	0.509
rs6895953	5	39084471	RICTOR	G/A	0.024	0.439	0.410	1.13 (0.98-1.30)	0.098
rs12749024	1	176522365	PAPPA2	C/T	-0.075	0.113	0.097	1.20 (0.94-1.53)	0.137
rs1046011	1	65898996	LEPR / LEPROT	C/T	-0.021	0.288	0.305	0.92 (0.79-1.07)	0.294
rs4980661	11	69306579	CCND1	A/G	0.014	0.479	0.490	0.95 (0.83-1.10)	0.517
rs7625680	3	11378069	ATG7	A/G	0.015	0.375	0.383	0.97 (0.84-1.12)	0.687
rs7545345	1	205690941	NUCKS1	T/C	-0.026	0.130	0.132	0.98 (0.80-1.20)	0.859
rs1050327	7	44808017	ZMIZ2	G/A	-0.017	0.459	0.464	0.98 (0.86-1.13)	0.818
rs73382439	6	20404420	E2F3	C/T	0.019	0.174	0.180	0.96 (0.80-1.16)	0.666
rs12471768	2	64928603	SERTAD2	C/T	0.022	0.308	0.293	1.07 (0.93-1.24)	0.349
rs6180	5	42719239	GHR	C/A	-0.035	0.531	0.546	0.94 (0.82-1.08)	0.406
rs1170158	13	42701941	DGKH	T/G	0.021	0.192	0.162	1.24 (1.04-1.49)	0.019
rs62302688	4	46448465	GABRA2	G/A	0.039	0.045	0.056	0.80 (0.57-1.11)	0.182
rs2075995	1	23847464	E2F2	A/C	-0.014	0.494	0.487	1.03 (0.90-1.18)	0.667
rs9819762	3	178914879	PIK3CA	T/C	0.019	0.179	0.181	0.99 (0.83-1.18)	0.900
rs1150752	6	32064726	TNXB	C/T	-0.031	0.900	0.898	1.02 (0.81-1.29)	0.841
rs34312198	7	99674870	ZNF3	C/A	-0.024	0.106	0.112	0.94 (0.76-1.17)	0.609
rs7740433	6	42908013	CNPY3	A/G	0.017	0.222	0.236	0.92 (0.77-1.11)	0.400
rs9611565	22	41767486	TEF	T/C	0.029	0.256	0.234	1.12 (0.96-1.32)	0.147
rs6853741	4	148982559	ARHGAP10	A/G	0.024	0.248	0.260	0.94 (0.80-1.10)	0.436
rs7758644	6	156583467	snoRNA	C/A	-0.019	0.141	0.155	0.89 (0.73-1.08)	0.243
rs11024614	11	18326758	HPS5	T/C	-0.023	0.429	0.420	1.04 (0.90-1.19)	0.605
rs4402747	2	225457173	CUL3	G/A	-0.016	0.470	0.467	1.01 (0.88-1.17)	0.863

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rs2896395	7	127511705	SND1	C/T	0.015	0.306	0.286	1.11 (0.95-1.29)	0.195
rs13195402	6	26463575	BTN2A1	T/G	-0.038	0.918	0.920	0.97 (0.76-1.25)	0.820
rs13069961	3	124358715	KALRN	A/G	-0.018	0.215	0.206	1.05 (0.89-1.25)	0.547
rs10769621	11	49860463	TRIM51FP	T/C	0.02	0.712	0.702	1.05 (0.90-1.23)	0.515
rs13178887	5	88355993	MEF2C-AS1	T/C	0.023	0.375	0.392	0.93 (0.81-1.07)	0.324
rs41285260	6	126661502	CENPW	T/G	0.039	0.957	0.952	1.11 (0.78-1.59)	0.558
rs4719393	7	14219213	DGKB	T/G	0.027	0.288	0.314	0.89 (0.76-1.03)	0.125
rs9398891	6	129314749	LAMA2	C/T	-0.017	0.302	0.312	0.96 (0.82-1.11)	0.564
rs13379043	14	74250126	ELMSAN1	T/C	0.025	0.257	0.252	1.02 (0.85-1.23)	0.824
rs12927172	16	27325021	IL4R	G/A	-0.015	0.385	0.399	0.94 (0.82-1.08)	0.407
rs77542162	17	67081278	ABCA6	G/A	0.054	0.990	0.992	0.78 (0.36-1.68)	0.529
rs9321106	6	128355316	PTPRK	A/G	0.018	0.163	0.177	0.90 (0.75-1.09)	0.286
rs1498603	5	58333125	PDE4D	T/G	0.031	0.063	0.057	1.10 (0.83-1.47)	0.514
rs11057265	12	123805950	SBN01	G/A	0.044	0.010	0.015	0.65 (0.35-1.22)	0.184
rs33969824	3	42679777	NKTR	G/T	0.02	0.886	0.896	0.90 (0.72-1.13)	0.372
rs1800574	12	121416864	HNF1A	T/C	0.145	0.973	0.976	0.89 (0.57-1.38)	0.611
rs8112883	19	7179320	INSR	G/T	0.017	0.282	0.268	1.07 (0.92-1.26)	0.386
rs35036084	4	97552791	LINC02267	T/C	0.017	0.363	0.385	0.91 (0.78-1.05)	0.200
rs116454156	10	95347041	FFAR4	A/G	0.078	0.983	0.982	1.06 (0.63-1.77)	0.835
rs7910087	10	77209145	LRMDA	C/T	-0.017	0.463	0.457	1.02 (0.89-1.17)	0.769
rs2250243	7	6690240	ZNF316	T/C	-0.024	0.249	0.247	1.01 (0.87-1.19)	0.865
rs2362755	3	24716668	THRB-AS1	G/T	-0.016	0.421	0.433	0.95 (0.82-1.10)	0.523
rs10252510	7	31023108	GHRHR	G/A	0.02	0.231	0.208	1.15 (0.89-1.49)	0.282
rs9292578	5	35230075	PRLR	C/A	0.04	0.032	0.039	0.82 (0.57-1.20)	0.308
rs67257872	11	8530218	STK33	A/G	0.014	0.448	0.456	0.97 (0.84-1.11)	0.652
rs1532824	16	10532211	ATF7IP2	C/A	-0.017	0.277	0.287	0.96 (0.82-1.11)	0.554
rs78598185	14	92791479	SLC24A4	A/G	-0.029	0.103	0.096	1.08 (0.86-1.36)	0.484
rs2378662	9	86707289	AL390838.1	A/G	-0.017	0.463	0.440	1.09 (0.95-1.26)	0.233
rs668799	17	40716235	COASY	C/T	0.018	0.261	0.275	0.93 (0.80-1.09)	0.381
rs4273010	15	44947434	SPG11	T/C	0.128	0.026	0.024	1.08 (0.70-1.68)	0.723
rs7254601	19	36147315	COX6B1	A/G	-0.016	0.205	0.188	1.12 (0.91-1.37)	0.271
rs4394044	4	186607420	SORBS2	T/C	0.014	0.423	0.398	1.11 (0.97-1.28)	0.137
rs6749680	2	73685852	ALMS1	A/G	0.015	0.385	0.387	0.99 (0.86-1.14)	0.911
rs10841649	12	20954879	SLCO1B3	C/T	0.021	0.100	0.100	1.00 (0.76-1.31)	0.997
rs7872812	9	119341544	ASTN2	C/T	-0.026	0.140	0.135	1.04 (0.85-1.28)	0.696
rs28929474	14	94844947	SERPINA1	T/C	-0.063	0.985	0.985	1.03 (0.59-1.83)	0.909
rs6924225	6	45584732	RUNX2	G/A	0.019	0.155	0.175	0.87 (0.72-1.05)	0.135
rs6701954	1	22022176	USP48	T/G	0.014	0.449	0.446	1.01 (0.88-1.16)	0.900
rs12666306	7	115082406	AC073901.1	G/A	0.017	0.484	0.470	1.06 (0.93-1.22)	0.387
rs4823324	22	46238123	ATXN10	T/C	0.016	0.414	0.423	0.96 (0.84-1.10)	0.572
rs10908903	9	92228559	GADD45G	T/G	0.015	0.459	0.455	1.01 (0.89-1.16)	0.856
rs1535793	13	47154966	LRCH1	A/G	0.024	0.234	0.257	0.88 (0.75-1.04)	0.138
rs6602909	13	114551993	GAS6	T/C	-0.02	0.326	0.328	0.99 (0.85-1.15)	0.920
rs13418037	2	218314141	DIRC3	C/T	-0.02	0.173	0.202	0.83 (0.69-0.99)	0.038
rs114949263	7	150498245	TMEM176B/TMEM176A	T/C	0.027	0.083	0.091	0.91 (0.70-1.19)	0.507
rs7921105	10	13535398	BEND7	T/C	-0.016	0.414	0.436	0.91 (0.79-1.05)	0.188
rs9657541	8	10643164	SOX7/PINX1/PINX1	C/T	0.02	0.211	0.199	1.08 (0.91-1.29)	0.382
rs6544549	2	42693056	KCNG3	T/C	0.024	0.118	0.127	0.92 (0.75-1.14)	0.450
rs1495741	8	18272881	NAT2	A/G	-0.026	0.225	0.229	0.98 (0.84-1.16)	0.832
rs28650790	5	55861464	C5orf67	C/T	-0.018	0.183	0.193	0.93 (0.78-1.12)	0.448
rs2250014	17	57836134	VMP1	T/C	-0.021	0.180	0.147	1.28 (1.06-1.54)	0.010
rs7783012	7	114116881	FOXP2	A/G	-0.016	0.435	0.419	1.06 (0.93-1.22)	0.372
rs79076440	15	63803863	USP3	A/G	0.019	0.167	0.173	0.96 (0.78-1.17)	0.664

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rs6532798	4	100054827	ADH4	T/C	0.037	0.321	0.294	1.14 (0.98-1.32)	0.089
rs10777540	12	94150321	CRADD	T/G	-0.018	0.503	0.465	1.16 (1.01-1.34)	0.038
rs1786342	8	101676363	SNX31	T/C	0.017	0.398	0.406	0.97 (0.84-1.11)	0.624
rs2978062	8	134571618	ST3GAL1	T/G	-0.019	0.051	0.051	1.00 (0.64-1.55)	0.999
rs112436634	1	10637709	PEX14	C/T	-0.016	0.311	0.304	1.04 (0.89-1.21)	0.643
rs10821713	10	62055781	ANK3	C/T	-0.017	0.411	0.407	1.02 (0.88-1.17)	0.834
rs1832007	10	5254847	AKR1C4	A/G	-0.057	0.146	0.139	1.06 (0.87-1.28)	0.571
rs6440008	3	141154542	ZBTB38	T/C	0.035	0.378	0.388	0.96 (0.83-1.12)	0.592
rs1165196	6	25813150	SLC17A1	A/G	-0.029	0.460	0.447	1.05 (0.92-1.21)	0.464
rs9892862	17	7439014	POLR2A	G/A	0.022	0.223	0.216	1.04 (0.88-1.23)	0.668
rs8075153	17	17622666	RAI1	C/T	0.021	0.448	0.419	1.13 (0.98-1.29)	0.087
rs6760135	2	26088769	ASXL2	C/T	-0.05	0.187	0.186	1.01 (0.84-1.22)	0.924
rs7574340	2	40621239	SLC8A1	C/T	-0.017	0.309	0.331	0.90 (0.78-1.05)	0.176
rs117529631	11	46159633	AC024475.4	C/T	-0.041	0.033	0.046	0.71 (0.49-1.02)	0.062
rs1061657	12	115108136	TBX3	T/C	-0.022	0.284	0.255	1.17 (1.00-1.38)	0.050
rs585187	18	58177124	MRPS5P4	T/G	0.015	0.505	0.491	1.06 (0.92-1.22)	0.393
rs202676	11	49227620	FOLH1	G/A	0.021	0.763	0.774	0.94 (0.80-1.11)	0.455
rs340837	1	214162734	PROX1	T/G	-0.021	0.466	0.459	1.03 (0.90-1.19)	0.653
rs11782452	8	26361601	BNIP3L	G/A	0.015	0.404	0.377	1.12 (0.97-1.29)	0.120
rs10509746	10	102656897	PAX2	C/T	0.027	0.410	0.452	0.84 (0.73-0.97)	0.020
rs8097893	18	74983055	GALR1	A/G	0.058	0.049	0.047	1.05 (0.76-1.45)	0.772
rs1825813	1	92708973	C1orf146	G/A	-0.023	0.100	0.117	0.82 (0.63-1.06)	0.132
rs4545755	15	51549044	MIR4713HG/CYP19A1	G/A	0.016	0.421	0.456	0.86 (0.75-0.99)	0.041
rs78357146	17	64305051	PRKCA	A/G	-0.09	0.015	0.016	0.95 (0.54-1.70)	0.874
rs870796	7	45426435	ELK1P1	G/A	0.017	0.428	0.435	0.97 (0.83-1.14)	0.741
rs11031058	11	30375889	ARL14EP	C/T	-0.022	0.167	0.176	0.95 (0.79-1.13)	0.541
rs296361	19	48389363	SULT2A1	G/A	-0.025	0.155	0.162	0.95 (0.78-1.15)	0.600
rs11111274	12	102838128	IGF1	A/G	-0.08	0.264	0.270	0.97 (0.83-1.13)	0.684
rs1039481	11	48182237	PTPRJ	A/G	-0.042	0.248	0.255	0.96 (0.82-1.13)	0.645
rs7314285	12	111522026	CUX2	T/G	-0.052	0.081	0.068	1.20 (0.93-1.56)	0.160
rs143885630	1	183482785	SMG7	G/A	0.03	0.107	0.121	0.86 (0.69-1.07)	0.174
rs61904289	11	85994731	APO03084.1	C/T	-0.016	0.283	0.315	0.87 (0.75-1.00)	0.058
rs1351394	12	66351826	HMGA2	C/T	0.024	0.467	0.475	0.97 (0.84-1.12)	0.699
rs76708468	17	62206299	ERN1	T/C	-0.087	0.008	0.007	1.18 (0.51-2.76)	0.698
rs147491123	16	72567795	LINC01572	C/T	0.036	0.008	0.007	1.10 (0.48-2.50)	0.827
rs8024330	15	67443926	SMAD3	C/T	0.018	0.312	0.309	1.02 (0.88-1.18)	0.840
rs12141189	1	221053545	HLX	C/T	-0.045	0.762	0.757	1.02 (0.87-1.21)	0.787
rs12108803	5	77158507	TBCA	T/G	-0.033	0.050	0.043	1.18 (0.86-1.62)	0.313
rs708108	1	228189855	WNT3A	C/T	-0.015	0.381	0.389	0.97 (0.84-1.12)	0.691
rs12710648	2	17989500	SMC6	A/G	0.017	0.492	0.485	1.03 (0.89-1.18)	0.724
rs2207132	20	39142516	MAFB	G/A	0.048	0.005	0.007	0.71 (0.27-1.87)	0.482
rs9532512	13	40769897	LINC00598	G/A	-0.043	0.186	0.191	0.97 (0.81-1.16)	0.738
rs11954036	5	59028853	PDE4D	T/C	0.037	0.345	0.331	1.07 (0.92-1.24)	0.386
rs2724373	1	207999200	C1orf132	C/T	0.019	0.335	0.347	0.95 (0.82-1.09)	0.461
rs569356	1	29136686	OPRD1	A/G	-0.027	0.131	0.129	1.02 (0.83-1.25)	0.871
rs11677980	2	30522137	LBH	A/G	-0.015	0.303	0.301	1.01 (0.86-1.19)	0.874
rs6501601	17	71124903	SLC39A11	G/A	0.015	0.172	0.184	0.93 (0.66-1.31)	0.675
rs16897515	6	27278020	POM121L2	A/C	-0.023	0.827	0.843	0.90 (0.74-1.08)	0.237
rs62136965	2	44347953	snRNA	T/C	-0.037	0.032	0.039	0.82 (0.57-1.19)	0.303
rs11149612	16	83980965	AC009119.2	C/T	0.027	0.313	0.303	1.06 (0.81-1.37)	0.685
rs17714046	5	180661980	TRIM41	C/T	0.042	0.000	0.000	1	
rs13301073	9	128284378	MAPKAP1	G/A	0.022	0.364	0.364	1.00 (0.87-1.15)	0.986
rs17050272	2	121306440	AC073257.2	G/A	0.024	0.410	0.420	0.96 (0.83-1.11)	0.571

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rs10913351	1	177447742	AL122019.1	G/A	-0.032	0.054	0.059	0.92 (0.68-1.24)	0.576
rs76393968	8	16282937	MSR1	G/A	0.06	0.002	0.003	0.60 (0.14-2.53)	0.487
rs7267595	20	10643850	JAG1	A/C	0.015	0.497	0.528	0.88 (0.77-1.01)	0.078
rs35641591	2	70323994	PCBP1-AS1	C/T	0.05	0.007	0.014	0.54 (0.26-1.10)	0.090
rs58387407	2	152924773	CACNB4	A/G	-0.018	0.213	0.183	1.21 (1.01-1.44)	0.034
rs6916994	6	87991236	GJB7	C/T	0.029	0.474	0.465	1.03 (0.90-1.18)	0.640
rs218291	6	108467024	OSTM1/OSTM1-AS1	G/A	0.016	0.364	0.340	1.11 (0.96-1.28)	0.151
rs10869022	9	74057313	TRPM3	C/T	0.021	0.198	0.189	1.06 (0.88-1.27)	0.551
rs142377191	17	61649170	DCAF7	G/A	-0.125	0.004	0.002	2.01 (0.50-8.07)	0.325
rs17258904	6	21928131	CASC15	A/G	-0.017	0.248	0.285	0.83 (0.71-0.97)	0.016
rs62182127	2	219279588	VIL1	A/G	0.019	0.460	0.436	1.10 (0.94-1.28)	0.232
rs2280099	4	90035549	TIGD2	G/A	0.025	0.850	0.828	1.18 (0.98-1.43)	0.084
rs411717	7	94033031	COL1A2	C/T	-0.015	0.442	0.451	0.96 (0.84-1.11)	0.597
rs1061638	14	77928525	AHSA1	G/A	0.018	0.326	0.320	1.03 (0.89-1.19)	0.717
rs1465529	2	231039037	SP110	T/C	0.019	0.288	0.303	0.93 (0.80-1.08)	0.345
rs75088740	14	69819101	GALNT16	G/A	-0.019	0.157	0.151	1.04 (0.86-1.27)	0.686
rs7539178	1	65383002	JAK1	A/C	-0.026	0.143	0.134	1.08 (0.88-1.32)	0.451
rs78607331	12	57648644	R3HDM2	T/C	-0.037	0.983	0.984	0.93 (0.53-1.66)	0.818
rs2607748	3	14158725	CHCHD4	T/C	-0.017	0.421	0.409	1.05 (0.91-1.21)	0.485
rs10145154	14	79939525	NRXN3	C/T	-0.018	0.176	0.184	0.94 (0.78-1.14)	0.556
rs11077337	16	3492048	AC025283.2/ZNF597	T/G	0.015	0.462	0.455	1.03 (0.90-1.18)	0.687
rs11928797	3	33457493	UBP1	A/C	0.03	0.952	0.955	0.92 (0.62-1.34)	0.654
rs4946810	6	107420270	BEND3	A/C	-0.016	0.403	0.372	1.14 (0.99-1.31)	0.067
rs6437249	2	242175331	HDLBP	C/T	0.019	0.306	0.294	1.06 (0.91-1.24)	0.458
rs207212	7	130547217	LINC00513	C/T	0.028	0.042	0.045	0.92 (0.63-1.35)	0.675
rs62280667	3	101084604	SENP7	T/C	-0.028	0.291	0.328	0.84 (0.71-0.99)	0.032
rs2366398	5	89437963	LINC01339	G/T	-0.018	0.197	0.194	1.03 (0.85-1.24)	0.773
rs112893170	3	57211863	IL17RD	T/C	0.02	0.146	0.146	1.00 (0.81-1.24)	0.999
rs9267488	6	31514247	ATP6V1G2-DDX39B	G/A	-0.031	0.891	0.886	1.05 (0.84-1.31)	0.645
rs3772102	3	98502628	ST3GAL6	T/G	-0.02	0.435	0.426	1.04 (0.90-1.20)	0.573
rs17265513	20	39832628	ZHX3	C/T	-0.022	0.840	0.818	1.16 (0.96-1.40)	0.124
rs62263345	3	107252190	BBX	A/G	0.028	0.110	0.104	1.06 (0.84-1.34)	0.620
rs11187838	10	96038686	PLCE1	G/A	0.024	0.442	0.450	0.97 (0.84-1.11)	0.652
rs11029620	11	3771924	NUP98	C/T	0.022	0.205	0.216	0.93 (0.79-1.11)	0.428
rs35862187	7	69625029	AUTS2	A/G	0.031	0.060	0.046	1.33 (0.97-1.81)	0.073
rs7790246	7	32976416	AVL9/RP9P	C/T	-0.017	0.276	0.283	0.97 (0.83-1.13)	0.686
rs504371	6	165724052	C6orf118	C/A	-0.015	0.350	0.337	1.06 (0.91-1.22)	0.446
rs840809	5	87173927	TMEM161B	A/C	0.016	0.273	0.286	0.94 (0.81-1.09)	0.429
rs6435156	2	203425475	BMPR2	C/T	0.024	0.246	0.252	0.97 (0.83-1.14)	0.723
rs2674492	2	172422338	CYBRD1	G/A	-0.014	0.396	0.357	1.19 (1.03-1.37)	0.019
rs750952	16	31093954	ZNF646	C/T	0.032	0.370	0.373	0.99 (0.86-1.14)	0.866
rs165316	1	91533297	RPL5P6	A/G	-0.073	0.203	0.192	1.07 (0.90-1.27)	0.430
rs13108218	4	3443931	HGFAC	G/A	0.017	0.403	0.368	1.16 (0.99-1.36)	0.061
rs2512525	11	77923019	USP35	T/C	0.024	0.150	0.160	0.92 (0.76-1.12)	0.422
rs72858776	11	15772953	AC087379.1	G/T	0.03	0.066	0.047	1.42 (1.03-1.95)	0.032
rs584955	6	7097141	RREB1	A/G	0.036	0.031	0.034	0.92 (0.63-1.35)	0.674
rs115805235	4	69764890	AC021146.3	C/T	0.039	0.036	0.040	0.89 (0.62-1.28)	0.520
rs3734166	5	137665323	CDC25C	A/G	0.028	0.734	0.748	0.93 (0.80-1.09)	0.386
rs1051006	11	47306585	MADD	A/G	0.04	0.834	0.823	1.08 (0.90-1.30)	0.403
rs625245	11	94192103	MRE11	T/G	-0.016	0.328	0.315	1.06 (0.92-1.23)	0.408
rs11175935	12	40693806	LRRK2	G/T	0.02	0.185	0.195	0.94 (0.79-1.12)	0.488
rs3858325	10	117988795	GFRA1	C/T	-0.019	0.462	0.481	0.93 (0.81-1.07)	0.306
rs903908	1	2202967	SKI	T/C	-0.016	0.465	0.501	0.87 (0.76-0.99)	0.042

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rs9361489	6	79816785	PHIP	T/C	0.022	0.491	0.480	1.04 (0.90-1.22)	0.575
rs2397112	6	52684333	GSTA6P	A/G	0.019	0.436	0.393	1.20 (1.04-1.38)	0.012
rs5755948	22	36179095	RBFOX2	G/A	-0.028	0.115	0.153	0.72 (0.59-0.89)	0.002
rs12106594	22	31885316	DRG1/EIF4ENIF1/SFI1	C/T	-0.036	0.057	0.051	1.10 (0.81-1.48)	0.539
rs7498665	16	28883241	SH2B1	G/A	0.019	0.638	0.603	1.16 (1.00-1.36)	0.056
rs17747633	15	40916237	KNL1	G/A	0.015	0.569	0.528	1.18 (1.03-1.36)	0.018
rs62334147	4	169345005	DDX60L	T/C	-0.019	0.182	0.163	1.14 (0.95-1.38)	0.166
rs2738787	20	62328375	TNFRSF6B/RTEL1	G/A	-0.037	0.097	0.092	1.06 (0.84-1.34)	0.610
rs9322822	6	105369598	LIN28B-AS1	C/T	0.015	0.329	0.305	1.12 (0.97-1.29)	0.136
rs9583151	13	107666257	-	C/T	0.014	0.514	0.487	1.11 (0.97-1.28)	0.133
rs7517340	1	243710190	AKT3	C/T	0.035	0.191	0.175	1.11 (0.93-1.32)	0.262
rs3127579	6	160674632	SLC22A2	G/A	-0.033	0.132	0.137	0.96 (0.78-1.17)	0.676
rs12912439	15	95828705	LINC01197	C/T	-0.022	0.283	0.300	0.92 (0.79-1.07)	0.271
rs2104476	20	54852856	-	A/G	-0.02	0.278	0.284	0.97 (0.83-1.13)	0.725
rs1431015	8	77131580	HNF4G	C/T	0.02	0.396	0.389	1.03 (0.89-1.18)	0.686
rs273956	7	137603188	CREB3L2	G/A	-0.021	0.467	0.464	1.01 (0.85-1.21)	0.896
rs2042253	5	143059433	MIR5197	T/C	0.023	0.235	0.254	0.90 (0.77-1.06)	0.217
rs56352849	8	73769173	KCNB2	G/A	-0.016	0.269	0.265	1.02 (0.87-1.20)	0.778
rs6106324	20	20964988	AL133465.1	T/C	0.019	0.383	0.390	0.97 (0.84-1.12)	0.682
rs12194618	6	38091030	ZFAND3	G/A	-0.017	0.355	0.377	0.91 (0.78-1.06)	0.229
rs12790261	11	66988048	KDM2A	C/A	-0.031	0.036	0.043	0.83 (0.57-1.20)	0.328
rs76914895	1	23292603	LACTBL1	T/C	-0.027	0.043	0.043	1.00 (0.70-1.44)	0.980
rs4418728	10	94839724	CYP26A1	G/T	0.024	0.453	0.475	0.91 (0.80-1.05)	0.194
rs12975366	19	54759361	LILRB5	C/T	-0.02	0.593	0.594	1.00 (0.86-1.15)	0.950
rs60862542	8	109275071	EIF3E	G/A	0.017	0.228	0.215	1.08 (0.92-1.27)	0.355
rs62102136	19	34700561	LSM14A	C/T	0.016	0.191	0.166	1.20 (0.96-1.50)	0.113
rs2230281	12	89917518	POC1B-GALNT4	G/A	-0.016	0.269	0.296	0.87 (0.75-1.02)	0.087
rs15052	19	41813375	HNRNPUL1/TGFB1	T/C	-0.018	0.120	0.130	0.92 (0.74-1.14)	0.438
rs168961	14	69282930	ZFP36L1	A/G	-0.018	0.496	0.502	0.98 (0.85-1.12)	0.727
rs75681856	1	174916323	RABGAP1L	C/T	-0.023	0.113	0.113	1.00 (0.80-1.24)	0.984
rs2273058	20	20033319	CRNKL1	G/A	-0.022	0.548	0.520	1.12 (0.98-1.29)	0.102
rs67868323	19	4048561	ZBTB7A	T/G	0.016	0.237	0.261	0.87 (0.73-1.04)	0.129
rs17400325	2	178565913	PDE11A	C/T	0.054	0.957	0.956	1.02 (0.73-1.44)	0.888
rs12454712	18	60845884	BCL2	T/C	0.018	0.363	0.349	1.06 (0.92-1.22)	0.415
rs199525	17	44847834	WNT3	T/G	-0.02	0.205	0.208	0.98 (0.83-1.16)	0.806
rs190102446	18	57048571	-	C/T	0.041	0.039	0.033	1.19 (0.83-1.71)	0.345
rs11152071	18	56087417	AC105105.3	C/T	0.02	0.234	0.254	0.89 (0.76-1.05)	0.173
rs35668185	5	168256455	SLIT3	T/C	0.056	0.198	0.207	0.94 (0.80-1.12)	0.509
rs8095538	18	1616505	-	T/G	-0.02	0.309	0.299	1.05 (0.90-1.23)	0.526
rs11079157	17	53360799	HLF	G/T	-0.02	0.154	0.184	0.80 (0.64-1.01)	0.058
rs4789227	17	73794354	UNK	T/C	0.015	0.347	0.339	1.03 (0.89-1.20)	0.669
rs1548917	16	56109333	CES5A	C/T	-0.015	0.446	0.434	1.05 (0.91-1.21)	0.527
rs6510033	19	30710785	AC005597.1	A/G	0.02	0.274	0.286	0.94 (0.81-1.10)	0.448
rs7578633	2	113978650	PAX8	C/T	-0.018	0.352	0.363	0.95 (0.83-1.10)	0.518
rs445036	8	81408409	ZBTB10	T/C	0.019	0.291	0.297	0.97 (0.84-1.13)	0.728
rs12549853	8	145020636	PLEC	G/A	-0.016	0.375	0.352	1.11 (0.95-1.29)	0.191
rs111443396	4	124773202	LINC01091	T/C	-0.026	0.125	0.110	1.15 (0.93-1.43)	0.191
rs4936759	11	122763516	C11orf63	C/T	0.016	0.431	0.448	0.93 (0.81-1.07)	0.305
rs17429745	4	106038169	AC096577.1	G/T	0.026	0.331	0.341	0.96 (0.83-1.11)	0.553
rs2287922	19	49232226	RASIP1	A/G	-0.03	0.492	0.508	0.94 (0.81-1.09)	0.415
rs28396553	14	36673392	lincRNA	T/C	0.015	0.421	0.421	1.00 (0.87-1.15)	0.964
rs6037508	20	3217989	SLC4A11	T/G	-0.017	0.300	0.301	1.00 (0.86-1.16)	0.965
rs17360994	1	27278573	KDF1	C/T	-0.042	0.931	0.921	1.15 (0.88-1.49)	0.306

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rs8138950	22	29448643	ZNRF3	C/T	0.015	0.521	0.512	1.04 (0.90-1.19)	0.605
rs7628689	3	88216647	C3orf38	G/A	0.029	0.144	0.132	1.11 (0.90-1.35)	0.327
rs5896	11	46745003	F2	T/C	0.036	0.874	0.867	1.06 (0.87-1.30)	0.568
rs2296198	6	18399750	RNF144B	C/T	0.016	0.255	0.230	1.15 (0.97-1.36)	0.112
rs66707192	3	186382065	HRG	G/A	0.018	0.253	0.266	0.93 (0.79-1.10)	0.396
rs62020698	15	43237414	UBR1	C/T	0.047	0.083	0.084	0.99 (0.77-1.26)	0.906
rs8059803	16	81603001	CMIP	A/G	0.031	0.268	0.295	0.87 (0.74-1.03)	0.101
rs26822	5	102518795	PPIP5K2	A/G	-0.017	0.305	0.331	0.89 (0.76-1.03)	0.117
rs9738365	12	31997635	-	C/A	-0.058	0.263	0.267	0.98 (0.84-1.15)	0.795
rs17299478	16	69775500	-	C/T	0.032	0.160	0.139	1.19 (0.97-1.44)	0.088
rs247917	12	46265916	ARID2	C/T	-0.015	0.478	0.493	0.94 (0.82-1.08)	0.381
rs13168379	5	173382761	CPEB4	G/A	-0.031	0.064	0.071	0.89 (0.67-1.18)	0.409
rs6974707	7	55982894	ZNF713	G/A	-0.019	0.199	0.220	0.88 (0.74-1.05)	0.149
rs1427676	2	204741166	CTLA4	T/C	0.015	0.320	0.321	0.99 (0.86-1.15)	0.906
rs36086195	1	16510894	ARHGEF19-AS1	T/C	-0.019	0.422	0.410	1.05 (0.91-1.21)	0.485
rs8054322	16	85201405	GSE1	G/A	-0.015	0.449	0.455	0.98 (0.84-1.14)	0.761
rs117104648	11	65543736	AP5B1	T/C	-0.036	0.048	0.041	1.18 (0.84-1.67)	0.344
rs77369503	1	163027266	RGS4	G/A	0.045	0.026	0.030	0.85 (0.56-1.28)	0.431
rs7256521	19	53837110	ZNF845	A/G	-0.015	0.457	0.484	0.90 (0.76-1.05)	0.172
rs998584	6	43757896	VEGFA	A/C	0.02	0.514	0.526	0.95 (0.83-1.10)	0.505
rs4547160	12	63503650	AVPR1A	G/T	-0.018	0.341	0.347	0.98 (0.85-1.13)	0.745
rs4985062	16	8996636	USP7	T/C	0.015	0.433	0.432	1.01 (0.86-1.18)	0.925
rs1430753	1	68692642	WLS	G/A	-0.021	0.199	0.184	1.11 (0.93-1.32)	0.249
rs79936318	14	64315556	SYNE2	G/A	-0.017	0.080	0.074	1.08 (0.73-1.60)	0.702
rs3804173	4	121719923	PRDM5	A/G	-0.02	0.321	0.315	1.03 (0.89-1.19)	0.724
rs12244851	10	114773926	TCF7L2	C/T	-0.015	0.294	0.333	0.83 (0.71-0.96)	0.014
rs1260326	2	27730940	GCKR	C/T	0.063	0.409	0.408	1.00 (0.87-1.16)	0.950
rs716100	8	135661278	ZFAT	G/A	-0.019	0.314	0.317	0.99 (0.86-1.15)	0.909
rs16995311	20	49201102	PTPN1	A/C	0.04	0.022	0.020	1.06 (0.63-1.78)	0.817
rs34040697	15	97125666	-	A/G	0.016	0.402	0.403	1.00 (0.85-1.17)	0.965
rs8084351	18	50726559	DCC	G/A	0.015	0.487	0.504	0.93 (0.81-1.07)	0.340
rs8033075	15	68353652	PIAS1	A/G	0.045	0.024	0.022	1.09 (0.68-1.75)	0.720
rs11242236	5	134586980	C5orf66	G/A	0.025	0.445	0.452	0.97 (0.84-1.11)	0.661
rs16845929	4	72017058	SLC4A4	C/T	0.032	0.049	0.044	1.11 (0.80-1.55)	0.531
rs6473015	8	78178485	lincRNA	A/C	-0.019	0.303	0.295	1.04 (0.89-1.21)	0.620
rs33932084	6	28268824	PGBD1	G/A	-0.034	0.916	0.916	0.99 (0.77-1.27)	0.940
rs13073970	3	170630520	EIF5A2	G/T	-0.025	0.223	0.199	1.16 (0.98-1.38)	0.082
rs2802330	1	26466831	PDIK1L	A/G	-0.031	0.163	0.164	0.99 (0.81-1.21)	0.944
rs73238159	3	142078759	XRN1	T/C	-0.025	0.866	0.884	0.84 (0.68-1.04)	0.116
rs80170948	5	64020316	SREK1IP1	T/G	-0.039	0.021	0.017	1.20 (0.72-2.01)	0.485
rs293275	10	53215020	PRKG1	T/C	-0.014	0.506	0.514	0.97 (0.84-1.11)	0.622
rs55707100	15	43820717	MAP1A	T/C	-0.151	0.973	0.974	0.94 (0.62-1.44)	0.778
rs5742915	15	74336633	PML	C/T	0.025	0.545	0.539	1.02 (0.89-1.17)	0.752
rs78460947	11	56143715	OR8U1	G/A	0.042	0.972	0.967	1.19 (0.80-1.77)	0.402
rs111792934	16	69131293	HAS3	C/T	0.022	0.163	0.159	1.04 (0.85-1.26)	0.712
rs3213223	11	2156930	IGF2/INS-IGF-2	G/A	-0.076	0.213	0.231	0.91 (0.77-1.07)	0.239
rs12211977	6	161252770	lincRNA	G/A	-0.023	0.094	0.102	0.91 (0.72-1.15)	0.450
rs10779509	1	209728370	AL023754.1	T/C	-0.014	0.425	0.440	0.94 (0.82-1.09)	0.427
rs11717397	3	23368583	UBE2E2	G/A	0.015	0.455	0.452	1.01 (0.88-1.17)	0.850
rs17323117	2	230162971	PID1	A/G	-0.029	0.032	0.033	0.97 (0.65-1.44)	0.868
rs175043	14	75471803	EIF2B2	G/A	0.018	0.441	0.472	0.88 (0.77-1.02)	0.081
rs12597502	16	53170069	CHD9	A/G	-0.015	0.295	0.293	1.01 (0.87-1.17)	0.871
rs12538762	7	47264328	TNS3	C/T	0.026	0.091	0.084	1.09 (0.84-1.41)	0.512

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rs684818	1	234854779	AL160408.6	T/C	0.024	0.473	0.459	1.06 (0.92-1.21)	0.433
rs74774288	16	5922263	RBFOX1	G/T	0.027	0.131	0.143	0.91 (0.73-1.13)	0.389
rs2023762	16	19276597	SYT17	T/C	0.015	0.489	0.481	1.03 (0.89-1.19)	0.679
rs146345029	11	59596007	GIF	G/A	-0.034	0.044	0.039	1.14 (0.81-1.61)	0.448
rs1055582	4	39700173	UBE2K	C/T	0.027	0.530	0.513	1.07 (0.93-1.23)	0.342
rs11064536	12	905582	WNK1	T/C	0.02	0.112	0.101	1.13 (0.89-1.45)	0.320
rs4075483	17	79074817	BAIAP2	C/T	0.017	0.368	0.381	0.95 (0.81-1.12)	0.564
rs56062334	3	172299226	LINC02068	T/C	0.017	0.479	0.475	1.02 (0.87-1.19)	0.798
rs8079923	17	19869544	AKAP10	C/T	0.016	0.248	0.244	1.02 (0.87-1.20)	0.785
rs9573360	13	74771429	KLF12	A/C	0.014	0.488	0.467	1.08 (0.95-1.24)	0.250
rs35135518	2	16120506	RN7SL104P	T/C	0.029	0.082	0.073	1.12 (0.86-1.47)	0.389
rs9978775	21	40694526	BRWD1-AS1	G/A	0.019	0.393	0.436	0.83 (0.72-0.96)	0.012
rs7502910	17	1638718	WDR81	A/G	0.016	0.492	0.502	0.96 (0.84-1.10)	0.597
rs4917962	10	103931931	NOLC1	G/T	-0.024	0.109	0.105	1.03 (0.82-1.30)	0.771
rs9809209	3	51281664	DOCK3	G/A	-0.017	0.357	0.365	0.97 (0.83-1.12)	0.646
rs58560372	19	38758752	SPINT2	C/T	0.02	0.134	0.151	0.87 (0.72-1.06)	0.176
rs35023999	11	113266411	ANKK1	C/A	0.015	0.490	0.513	0.91 (0.80-1.05)	0.207
rs62342064	4	104665972	TACR3	C/T	0.022	0.026	0.039	0.67 (0.41-1.09)	0.105
rs11577063	1	179341999	AXDND1	G/T	-0.02	0.241	0.221	1.12 (0.95-1.32)	0.189
rs10745954	12	103483094	AC068643.1	G/A	0.015	0.489	0.492	0.99 (0.86-1.14)	0.875
rs6088579	20	33284624	PIGU/NCOA6	G/A	0.027	0.149	0.155	0.95 (0.78-1.15)	0.608
rs10860237	12	98157010	AC007424.1	G/A	-0.03	0.311	0.345	0.86 (0.74-1.00)	0.045
rs72761177	16	1833508	NUBP2	A/G	0.077	0.932	0.905	1.44 (1.11-1.87)	0.006
rs61867536	11	1513700	MOB2	C/T	-0.018	0.526	0.544	0.93 (0.81-1.06)	0.294
rs2228561	3	48628014	COL7A1	A/G	0.02	0.875	0.870	1.04 (0.85-1.28)	0.696
rs10114121	9	19440136	ACER2	G/A	-0.02	0.101	0.106	0.94 (0.73-1.21)	0.617
rs8182173	16	4420787	COR07-PAM16	C/T	-0.018	0.259	0.260	0.99 (0.85-1.17)	0.933
rs10811787	9	22871816	AL391117.1	T/C	-0.015	0.511	0.503	1.03 (0.90-1.19)	0.667
rs11557154	9	34107505	DCAF12	T/C	0.024	0.868	0.877	0.92 (0.75-1.13)	0.445
rs9398171	6	108983527	FOXO3	T/C	0.05	0.303	0.288	1.08 (0.92-1.26)	0.341
rs2737205	8	116610180	TRPS1	C/T	-0.023	0.428	0.424	1.02 (0.88-1.18)	0.789
rs72828596	6	19183591	AL589647.1	G/A	-0.019	0.086	0.097	0.87 (0.67-1.14)	0.317
rs12491473	3	46989904	CCDC12	G/A	0.02	0.409	0.414	0.98 (0.85-1.13)	0.778
rs2412973	22	30529631	HORMAD2	C/A	-0.014	0.462	0.485	0.91 (0.80-1.05)	0.195
rs75660441	9	97662448	C9orf3	A/G	0.039	0.050	0.056	0.89 (0.65-1.21)	0.452
rs61780439	1	41490177	SLFN1-AS1	G/A	0.021	0.198	0.205	0.96 (0.80-1.15)	0.650
rs33912345	14	60976537	SIX6	A/C	-0.023	0.398	0.417	0.92 (0.80-1.06)	0.269
rs4306136	1	221608720	AL360013.2	A/G	0.017	0.434	0.404	1.13 (0.98-1.30)	0.085
rs3890746	6	130371055	L3MBTL3	T/C	-0.02	0.428	0.438	0.96 (0.84-1.10)	0.568
rs34670419	7	99130834	ZKSCAN5	G/T	-0.036	0.040	0.031	1.28 (0.89-1.86)	0.181
rs790513	6	154420368	OPRM1	C/A	0.025	0.258	0.235	1.14 (0.97-1.34)	0.117
rs12723255	1	21233570	EIF4G3	T/C	-0.017	0.423	0.417	1.03 (0.89-1.18)	0.721
rs2801482	10	12459773	CAMK1D	A/G	-0.05	0.022	0.015	1.51 (0.89-2.56)	0.130
rs12699547	7	2015970	MAD1L1	C/T	0.021	0.342	0.364	0.91 (0.78-1.05)	0.195
rs3131646	1	40383552	MYCL	G/T	0.016	0.291	0.278	1.06 (0.91-1.24)	0.437
rs1127313	1	154556425	ADAR	G/A	0.024	0.486	0.488	0.99 (0.86-1.14)	0.903
rs6416868	17	15924370	TTC19	G/A	-0.019	0.414	0.410	1.02 (0.88-1.17)	0.824
rs12935465	16	17476853	XYLT1	T/C	0.016	0.489	0.481	1.03 (0.89-1.19)	0.723
rs2602717	19	4902950	UHRF1/ARRDC5	C/T	0.019	0.104	0.083	1.27 (0.91-1.75)	0.155
rs4788220	16	30063780	FAM57B	A/G	-0.017	0.474	0.471	1.01 (0.88-1.17)	0.837
rs811332	3	138078348	MRAS	C/T	0.019	0.166	0.197	0.81 (0.68-0.97)	0.021
rs940400	1	200269134	LINC00862	C/A	0.025	0.113	0.105	1.07 (0.86-1.34)	0.530
rs687339	3	135932359	AC092991.1	T/C	0.04	0.217	0.230	0.92 (0.78-1.09)	0.350

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rs7034716	9	101858382	TGFBR1	C/T	0.015	0.198	0.197	1.01 (0.80-1.27)	0.941
rs71432868	13	106559402	SNORA25	T/C	-0.028	0.009	0.006	1.39 (0.55-3.48)	0.485
rs17037452	1	11895675	CLCN6	A/G	0.023	0.166	0.164	1.01 (0.84-1.21)	0.921
rs2348604	5	136809831	SPOCK1	T/C	-0.016	0.244	0.274	0.86 (0.73-1.01)	0.061
rs1055710	9	96214928	FAM120AOS	A/G	-0.018	0.651	0.641	1.05 (0.90-1.22)	0.522
rs73954943	2	111890432	BCL2L11	G/A	-0.031	0.058	0.061	0.94 (0.70-1.26)	0.692
rs670049	6	100087024	PRDM13	A/C	0.019	0.320	0.325	0.98 (0.85-1.13)	0.779
rs7947951	11	13356030	ARNTL	G/A	0.02	0.317	0.324	0.97 (0.84-1.13)	0.698
rs1115897	14	93910816	UNC79	A/C	0.021	0.329	0.290	1.21 (1.04-1.41)	0.012
rs1182174	7	2875420	GNA12	G/A	-0.021	0.300	0.293	1.03 (0.89-1.20)	0.690
rs34452566	11	27793470	AC103796.1	G/T	-0.018	0.123	0.142	0.84 (0.66-1.07)	0.152
rs6510177	19	31211647	ZNF536	C/T	-0.023	0.038	0.036	1.07 (0.62-1.84)	0.820
rs11556924	7	129663496	ZC3HC1	T/C	-0.016	0.738	0.708	1.17 (0.95-1.45)	0.135
rs773116	12	56486159	ERBB3	G/A	0.016	0.453	0.456	0.99 (0.86-1.13)	0.852
rs28831479	9	98254526	PTCH1	C/A	0.022	0.251	0.261	0.95 (0.81-1.11)	0.495
rs599839	1	109822166	PSRC1/CELSR2	A/G	-0.031	0.234	0.229	1.03 (0.88-1.22)	0.703
rs3791679	2	56096892	EFEMP1	A/G	-0.018	0.228	0.227	1.01 (0.85-1.19)	0.928
rs4768	3	49758764	RNF123	A/G	-0.015	0.299	0.298	1.00 (0.86-1.16)	1.000
rs6519133	22	39096602	JOSD1	T/C	0.029	0.450	0.438	1.05 (0.89-1.23)	0.551
rs11856160	15	93452846	CHD2	A/G	0.021	0.127	0.142	0.88 (0.72-1.08)	0.222
rs41277821	9	109689972	ZNF462	T/C	0.062	0.987	0.984	1.24 (0.70-2.19)	0.463
rs56030650	17	38131187	GSDMA	A/C	-0.022	0.572	0.552	1.08 (0.94-1.25)	0.252
rs2460488	12	116187660	-	G/A	0.026	0.166	0.178	0.92 (0.77-1.10)	0.365
rs4709995	6	166313447	PDE10A	C/T	-0.042	0.386	0.400	0.94 (0.82-1.09)	0.415
rs7667562	4	129133826	LARP1B	C/A	0.016	0.263	0.282	0.91 (0.78-1.06)	0.221
rs73271090	5	132313550	AC010240.1	G/A	0.044	0.120	0.099	1.24 (0.96-1.60)	0.093
rs702878	2	65702609	AC007389.1	A/G	0.014	0.444	0.423	1.09 (0.95-1.26)	0.236
rs7802508	7	1191689	ZFAND2A	G/A	-0.021	0.400	0.383	1.07 (0.93-1.23)	0.366
rs7774230	6	152164239	ESR1	C/T	-0.026	0.469	0.465	1.02 (0.89-1.17)	0.771
rs174554	11	61579463	FADS1/FADS2	A/G	0.022	0.331	0.328	1.02 (0.88-1.17)	0.838
rs11671304	19	47564643	ZC3H4	T/C	-0.018	0.320	0.308	1.05 (0.90-1.23)	0.518
rs6479003	9	102948685	INVS	G/A	0.024	0.051	0.041	1.24 (0.87-1.77)	0.235
rs2227819	5	76012745	F2R	C/T	-0.022	0.095	0.098	0.96 (0.76-1.22)	0.749
rs2856321	12	11855773	ETV6	A/G	-0.026	0.357	0.332	1.12 (0.94-1.33)	0.195
rs10047326	10	22839463	PIP4K2A	A/C	0.017	0.353	0.361	0.96 (0.83-1.11)	0.609
rs12935091	16	71525208	ZNF19	A/G	-0.035	0.025	0.031	0.79 (0.51-1.24)	0.309
rs12231073	12	38526901	-	G/T	-0.017	0.357	0.370	0.91 (0.74-1.12)	0.377
rs74657816	7	46670682	HMGN1P19	T/G	0.047	0.033	0.035	0.95 (0.64-1.41)	0.789
rs142354201	15	99524022	PGPEP1L	G/A	0.034	0.038	0.035	1.09 (0.75-1.59)	0.639
rs10757291	9	22161884	CDKN2B-AS1	A/G	-0.019	0.480	0.466	1.06 (0.92-1.22)	0.403
rs10893499	11	126241979	ST3GAL4	G/A	0.022	0.126	0.125	1.01 (0.81-1.24)	0.952
rs1822825	3	12449963	PPARG	A/G	-0.014	0.477	0.470	1.03 (0.90-1.18)	0.682
rs55717031	3	138848505	MRPS22	G/T	0.032	0.307	0.301	1.03 (0.89-1.20)	0.701
rs2309401	17	5471902	NLRP1	T/G	0.015	0.372	0.382	0.96 (0.83-1.11)	0.556
rs8105174	19	10347032	DNMT1	C/T	0.05	0.166	0.182	0.89 (0.74-1.08)	0.229
rs2270628	7	45949570	IGFBP3	C/T	-0.033	0.197	0.182	1.11 (0.93-1.32)	0.244
IGF-BP3									
rs11977526	7	46008110	IGFBP3	A/G	0.287	0.587	0.547	1.19 (1.03-1.37)	0.018
rs700753	7	46753684	TNS3	G/C	0.158	0.333	0.310	1.11 (0.96-1.29)	0.175
rs4234798	4	7219933	SORCS2	G/T	0.095	0.391	0.374	1.07 (0.93-1.23)	0.342
rs1065656	16	1838836	NUBP2	G/C	0.111	0.302	0.281	1.10 (0.95-1.29)	0.206

*Alleles are high allele/low allele. Low allele was used as the reference allele and high allele as effect allele. MAF: minor allele frequency; β estimates of SNP-IGF1 and SNP-IGF-BP3 association were from published GWAS; **Adjusted by age, gender.