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Insights into Gene Expression and the Influence of Regulatory Mechanisms within Meningioma - A Bioinformatic Approach

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Supplementary Material

Supplementary Material 1- Full list of transcription factor and miRNAs that have potential influence on the observed gene expression of Grade 1 v.s Grade 3. Highlighted in orange are the shared miRNA found in both groups. Pax4 is highlighted in purple and FOX transcription factor family are highlighted in blue.

GEO2R TF	X2K TF downregulated genes	X2K TF upregulated genes	GSEA TF	GSEA miRNA
LMO4	UBTF	E2F4	E2F1DP1_01	CTCAGGG_MIR125B_MIR125A
NFIA	SMC3	SIN3A	SGCGSSAAA_E2F1DP2_01	ATCATGA_MIR433
ZFH3	RFX5	MAX	CCGNMNTNACG_UNKNOWN	GACAGGG_MIR339
SIX2	AR	MYC	E2F4DP2_01	GCAAGGA_MIR502
CREBRF	SMAD4	FOXM1	KTGGYRSGAA_UNKNOWN	GTCAGGA_MIR378
SMAD7	USF2	NFYA	E2F_Q3_01	AATGTGA_MIR23A_MIR23B
FOXJ3	NFE2L2	NFYB	E2F1DP1RB_01	AGGAAGC_MIR5163P
SMAD9	TRIM28	E2F6	MYAATNNNNNNNGGC_UNKNOWN	CTCTGGA_MIR520A_MIR525
FOXP1	SOX2	E2F1	GGAANCGGAANY_UNKNOWN	ACACTGG_MIR199A_MIR199B
MEF2C	TCF3	GABPA	GKCGCNNNNNNNTGAYG_UNKNOWN	GTGCCTT_MIR506
AFF1	ZKSCAN1	ELF1	TGCCAAR_NF1_Q6	GCATTTG_MIR105
PHTF1	TRIM28	MYC	MYOGENIN_Q6	TGCTGCT_MIR15A_MIR16_MIR15B_MIR195_MIR424_MIR497
ZMYM6	USF1	CREB1	WGTTNNNNNAAA_UNKNOWN	CAGTATT_MIR200B_MIR200C_MIR429
GPBP1L1	FOXA1	TAF1	PAX4_02	ACCAAAG_MIR9
RERE	GATA2	BRCA1	CTTTAAR_UNKNOWN	CTTTGTA_MIR524
TAF12	ESR1	ATF2	YKACATTT_UNKNOWN	AAGCCAT_MIR135A_MIR135B
BMPR1A	RELA	PML	TAATTA_CHX10_01	TGCTTTG_MIR330
SNAI3	ZC3H11A	CREB1	IRF2_01	GCACTTT_MIR175P_MIR20A_MIR106A_MIR106B_MIR20B_MIR519D
MLXIPL	ZNF384	IRF3	HNF4ALPHA_Q6	TGAATGT_MIR181A_MIR181B_MIR181C_MIR181D
SCMH1	ZMIZ1	SP1	SRY_01	AACATTC_MIR4093P
TBR1	SUZ12	FOS		
ZKSCAN5	TP63	YY1		
SLC2A4RG	ERG	NRF1		

UBN1	FOXP2	SIX5		
ZNF133	TCF3	BCLAF1		
ZNF207	CTCF	ZNF384		
AHCTF1	IRF1	FLI1		
SCML2	MYOD1	ZBTB33		
FOXM1	NANOG	SP2		
RAI1	FOS	ZMIZ1		
E2F2	NRF1	STAT3		
REXO4	SUZ12	USF1		
MYBL1	EGR1	PBX3		
GATAD2A	SIX5	USF2		
E2F7	ZEB1	TAF7		
KDM5B	STAT3	KLF4		
PTTG1	BRCA1	RFX5		
	CHD1	ETS1		
	GATA1	NR2C2		
	CBX3	ZBTB7A		
	ZBTB7A	CBX3		
	EZH2	SRF		
	REST	YY1		
	SALL4	EGR1		
	NFIC	IRF1		
	IRF3	SPI1		
	RCOR1	KAT2A		
	TP53	CHD1		
	SPI1	ERG		
	STAT3	TCF7L2		
	POU5F1	PPARD		
	NR2C2	SOX2		
	RAD21	BHLHE40		

YY1	ATF3		
CREB1	NANOG		
VDR	SPI1		
EGR1	HDAC2		
ELF1	ZKSCAN1		
SRF	TRIM28		
HDAC2	CEBPD		
SPI1	TP53		
BHLHE40	RCOR1		
KAT2A	TCF3		
FOXA2	UBTF		
RUNX1	CEBPB		
YY1	SALL4		
PBX3	POU5F1		
HNF4A	STAT5A		
EZH2	BCL3		
CEBPD	RUNX1		
STAT5A	NFIC		
CREB1	FOSL2		
KLF4	NELFE		
TCF7L2	TCF3		
CEBPB	PPARG		
SIN3A	SMAD4		
NFYA	FOXA1		
GABPA	TRIM28		
NFYB	HNF4A		
ETS1	REST		
SP1	VDR		
SP2	ZC3H11A		
TAF1	STAT3		

	NELFE	FOXP2		
	ATF2	FOXA2		
	IRF8	CTCF		
	PPARG	AR		
	BCLAF1	ZEB1		
	BCL3	EGR1		
	E2F1	RAD21		
	PPARD	IRF8		
	MYC	REST		
	TAF7	ESR1		
	ZBTB33	RELA		
	FLI1	NFE2L2		
	E2F4	MYOD1		
	REST	GATA1		
	FOSL2	SMC3		
	E2F6	EZH2		
	PML	TP63		
	MAX	GATA2		
	MYC	EZH2		
		SUZ12		

Supplementary Material 2- Full list of transcription factor and miRNAs that have potential influence on the observed gene expression of non-aggressive v.s aggressive. Highlighted in orange are the shared miRNA found in both groups. Pax4 is highlighted in purple and FOX transcription factor family are highlighted in blue.

GEO2R TF	X2K TF downregulated genes	X2K TF upregulated genes	GSEA TF	GSEA miRNA
SMAD9	SUZ12	E2F4	MYCMAX_01	ATGTCAC MIR-489
MLXIPL	SOX2	SIN3A	SCGGAAGY_ELK1_02	TCTCTCC MIR-185
ZMYM6	SMAD4	MAX	CATRRAGC_UNKNOWN	GTCAGGA MIR-378
ZNF207	NFE2L2	MYC	STAT3_02	TAGGTCA MIR-192 MIR-215

GPBP1L1	UBTF	FOXM1	SGCGSSAAA_E2F1DP2_01	CTTTGCA MIR-527
FOXJ3	GATA2	GABPA	E2F1_Q6	GTTTGTT MIR-495
TGIF2	AR	NFYB	ALPHACP1_01	AGGGCAG MIR-18A
ATOH8	GATA1	NFYA	ATF_B	CTACCTC_LET7A_LET7B_LET7C_LET7D_LET7E_LET7F_MIR98_LET7G_LET7I
GATAD2A	SALL4	E2F6	TAAWWATAG_RSRFC4_Q2	CTCAGGG_MIR125B_MIR125A
ZNF263	SPI1	ELF1	TST1_01	CTATGCA_MIR153
RFX2	SMC3	BRCA1	TGCCAAR_NF1_Q6	GCATTG_MIR105
TAF12	ESR1	MYC	IRF1_01	CACTTG_MIR520G_MIR520H
PTTG1	FOXA1	E2F1	PAX4_04	AACATTC_MIR4093P
SCML1	SPI1	TAF1	PAX4_02	ATATGCA_MIR448
SP4	TRIM28	CREB1	FREAC2_01	AACTGGA_MIR145
LMO4	HDAC2	PML	HNF4ALPHA_Q6	TGCTGCT_MIR15A_MIR16_MIR15B_MIR195_MIR424_MIR497
RAI1	USF2	CREB1	PXR_Q2	CAGTATT_MIR200B_MIR200C_MIR429
ZFP36L2	MYOD1	YY1	RTTTNNNYTGGM_UNKNOWN	CAGGGTC_MIR504
FOXP1	BHLHE40	FLI1	IRF2_01	TGAATGT_MIR181A_MIR181B_MIR181C_MIR181D
ZNF585B	ZC3H11A	ATF2	PITX2_Q2	GCACTTT_MIR175P_MIR20A_MIR106A_MIR106B_MIR20B_MIR519D
ZFH3	TCF3	SIX5		
NFIC	USF1	NRF1		
UHRF1	TCF3	BCLAF1		
SMAD7	NRF1	IRF3		
GTF2IRD1	TRIM28	FOS		
TEAD2	RFX5	SP2		
FOXI2	CBX3	SP1		
SIX2	SUZ12	USF2		
E2F7	ZNF384	KLF4		
MYBL1	PPARG	ZNF384		
THRA	RELA	ETS1		
NFIA	POU5F1	USF1		
ZNF133	EZH2	ZBTB33		
ZBED8	YY1	BHLHE40		

YBX1	ZBTB7A	PBX3		
FOXM1	HNH4A	SPI1		
HOXB7	CTCF	YY1		
ZNF217	VDR	IRF1		
EPAS1	BRCA1	ZBTB7A		
NPAS1	ZMIZ1	ZMIZ1		
MEF2C	TP63	NANOG		
AFF1	NANOG	RFX5		
E2F2	FOXP2	TCF7L2		
ZNF514	RUNX1	STAT3		
BMPR1A	ERG	ATF3		
RERE	BCLAF1	RCOR1		
ATF5	TCF7L2	CTCF		
ZNF300	STAT3	SPI1		
SCAND1	STAT3	TAF7		
ARID4A	REST	HNH4A		
KDM5B	FOXA2	NR2C2		
ZNF586	SRF	CHD1		
NFIX	ZEB1	POU5F1		
SLC2A4RG	KLF4	TRIM28		
ZNF219	CHD1	CEBPD		
SIX1	TP53	SRF		
LHX2	STAT5A	SOX2		
PA2G4	IRF1	NFIC		
SCMH1	NELFE	ZKSCAN1		
TCEAL1	SIX5	CBX3		
MTA3	KAT2A	EGR1		
TARDBP	EGR1	CEBPB		
FLI1	ETS1	BCL3		
ELF1	MYC	ZC3H11A		

UBN1	NFIC	SMC3		
GATA2	EGR1	RUNX1		
ID3	RAD21	STAT3		
FOXS1	IRF3	PPARD		
TBR1	TAF1	RAD21		
SNAPC4	FOS	STAT5A		
ZNF436	ZBTB33	UBTF		
REXO4	RCOR1	PPARG		
NOCT	PPARD	TCF3		
TSC22D3	ZKSCAN1	TRIM28		
ZNF138	ELF1	ERG		
NFE2	IRF8	HDAC2		
LZTS1	FOSL2	FOXP2		
AATF	CEBPD	NELFE		
ELF3	NR2C2	SALL4		
TWIST1	YY1	FOXA2		
JDP2	PBX3	TCF3		
ZNF837	MYC	KAT2A		
TCF3	NFYB	TP53		
	TAF7	ZEB1		
	CREB1	VDR		
	CEBPB	FOSL2		
	BCL3	REST		
	FLI1	FOXA1		
	ATF2	SMAD4		
	E2F6	EZH2		
	SP2	GATA2		
	EZH2	IRF8		
	NFYA	REST		
	ATF3	EZH2		

	REST	AR		
	SP1	SUZ12		
	E2F4	ESR1		
	E2F1	TP63		
	PML	RELA		
	GABPA	NFE2L2		
	SIN3A	GATA1		
	CREB1	EGR1		
	MAX	MYOD1		
		SUZ12		