Supporting Information

A pan-cancer analysis of transcriptome alterations associated with somatic mutations in *U2AF1* reveals commonly altered splicing events

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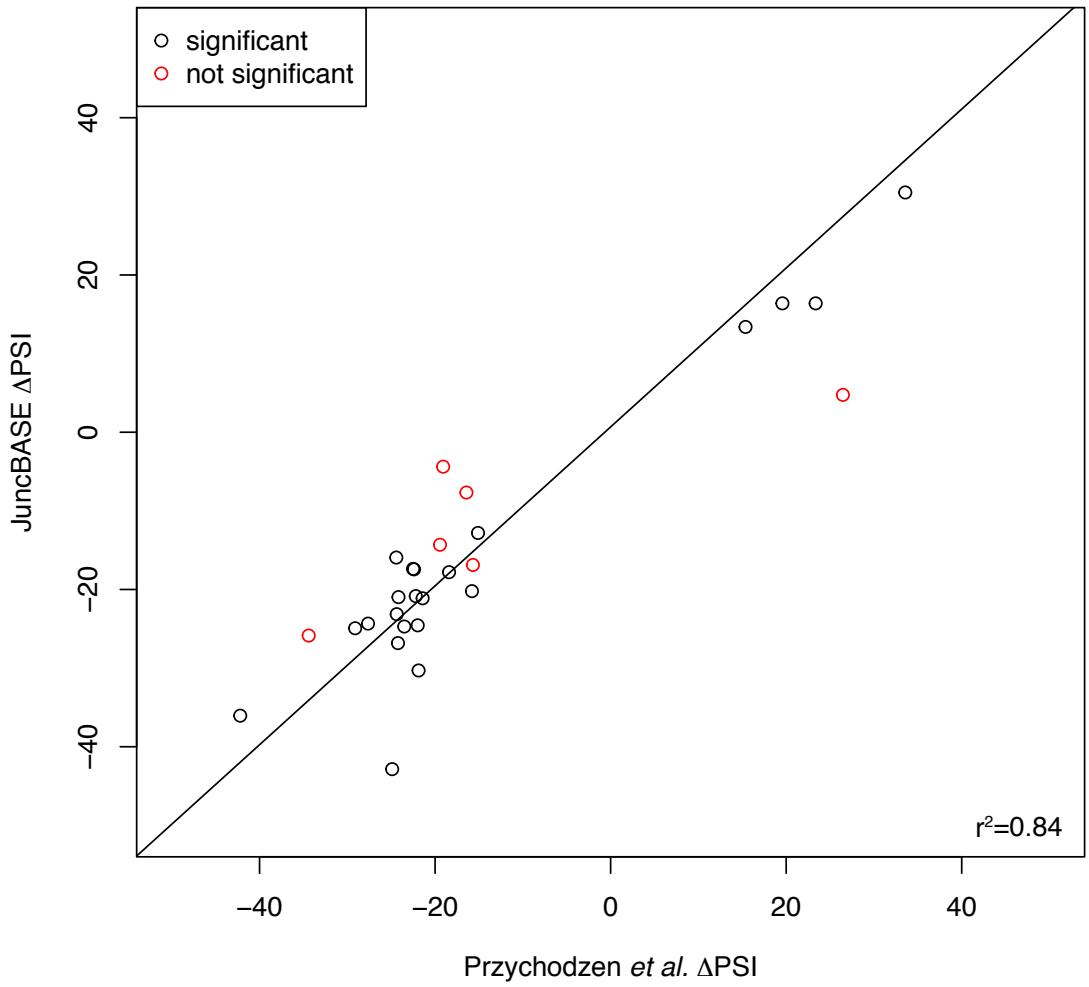


Figure S1: Correlation of ΔPSI values between JuncBASE and Przychodzen *et al.* [1]

Difference of percent spliced in (PSI) values between AML samples with and without splicing factor mutations were reported in Przychodzen *et al.* and compared to JuncBASE quantified values. Red circles indicate splice events that were quantified, but not significantly associated with *U2AF1* mutation by JuncBASE analysis. Least squares regression line is shown.

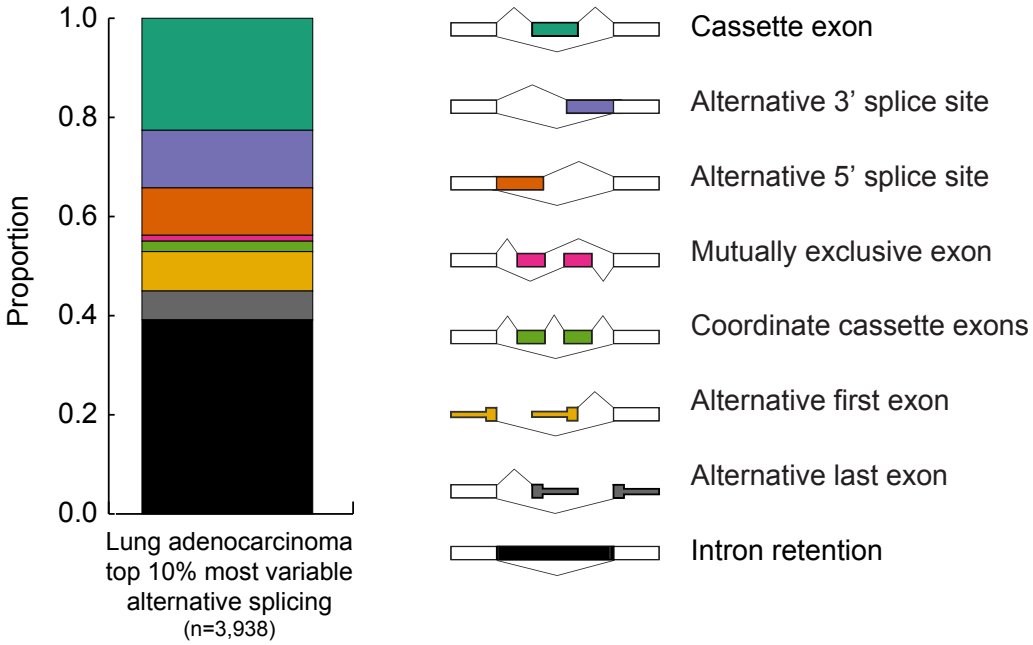


Figure S2: Highly variable alternative splicing events in lung adenocarcinoma.

Proportion of alternative splicing events in the top 10% most variable splicing events in lung adenocarcinomas with no mutation in a splicing factor.

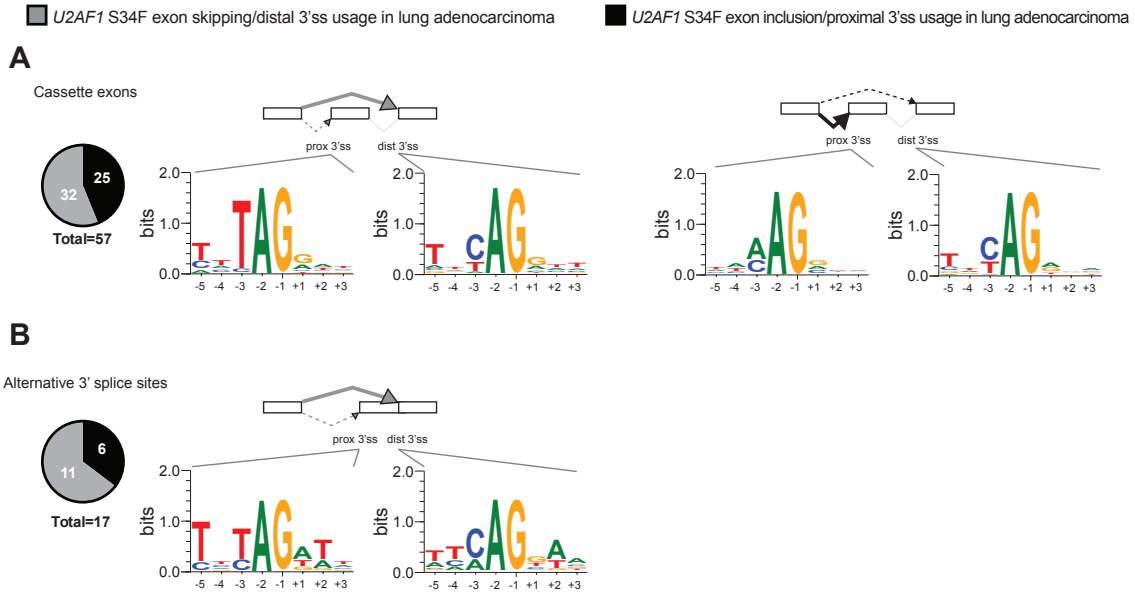


Figure S3: Splice site motifs at cassette exon and alternative 3' splice site changes associated with *U2AF1* S34F mutation in lung adenocarcinoma.

(**A**) Number of cassette exons showing significant skipping or inclusion in *U2AF1* mutated lung adenocarcinomas. Consensus motifs associated with the splice sites are shown. (**B**) Number of alternative 3' splice site events showing significant skipping or inclusion in *U2AF1* mutated lung adenocarcinomas. Consensus motifs associated with the splice sites are shown. Consensus motifs were only made for cases with 10 or more exon skipping or inclusion events.

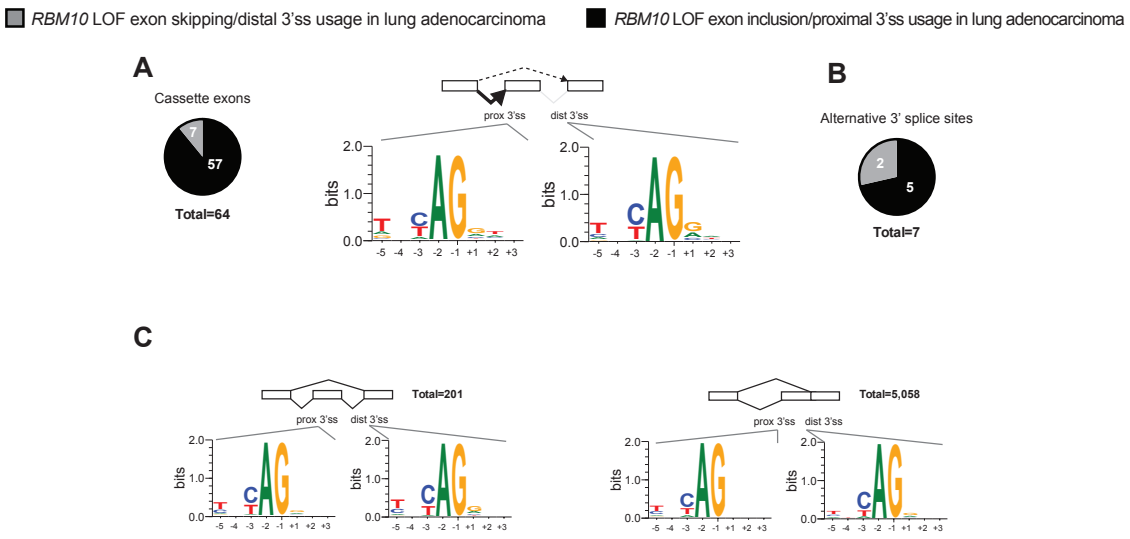


Figure S4: Splice site motifs at cassette exon and alternative 3' splice site changes associated with *RBM10* loss-of-function (LOF) mutation in lung adenocarcinoma and control alternative splicing events.

(**A**) Number of cassette exons showing significant skipping or inclusion in *RBM10* LOF lung adenocarcinomas. Consensus motifs associated with the splice sites are shown. (**B**) Number of alternative 3' splice site events showing significant skipping or inclusion in *RBM10* LOF lung adenocarcinomas. Consensus motifs were only made for cases with 10 or more exon skipping or inclusion events. (**C**) Consensus sequence motifs at the proximal and distal 3' splice sites of control alternative splicing events.

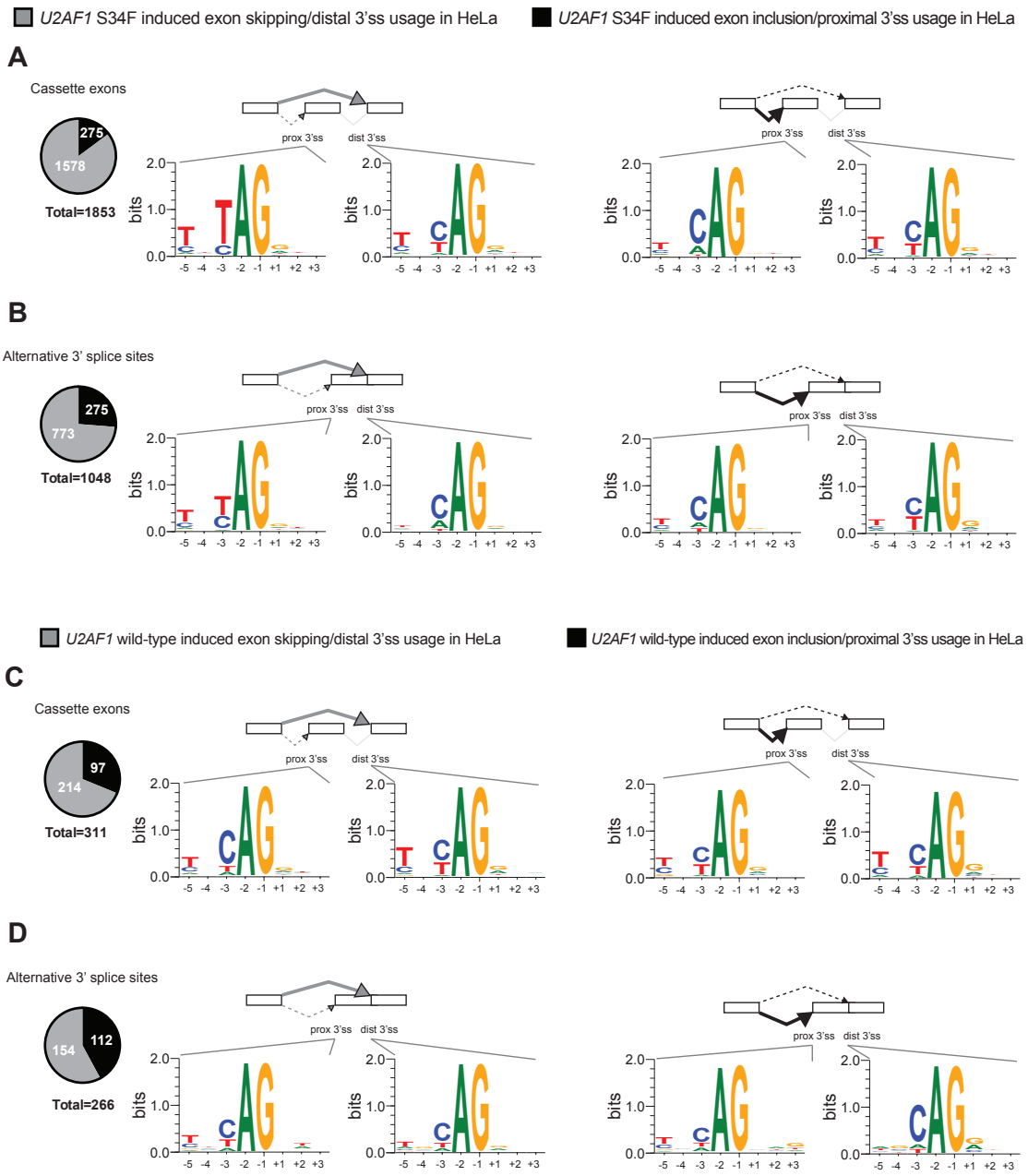


Figure S5: Splice site motifs at cassette exon and alternative 3' splice site changes associated with induction of *U2AF1* S34F or *U2AF1* wild-type in HeLa cells.

Number of cassette exons showing significant skipping or inclusion in HeLa cells + induction of (**A**) *U2AF1* S34F or (**C**) U2AF1 wild-type. Number of alternative 3' splice sites showing significant skipping or inclusion in HeLa cells + induction of (**B**) *U2AF1* S34F or (**D**) U2AF1 wild-type. Consensus motifs associated with the splice sites are shown.

A

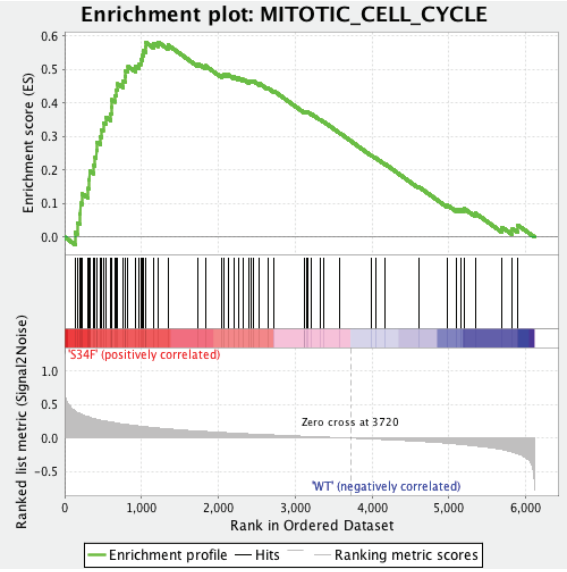
GO:0000278
mitotic cell cycle

Enrichment score:
0.582

Normalized enrichment score:
1.735

Nominal p-value:
0.038

FDR:
1



B

GO:0000087
M phase of mitotic cell cycle

Enrichment score:
0.688

Normalized enrichment score:
1.679

Nominal p-value:
0.048

FDR:
0.968

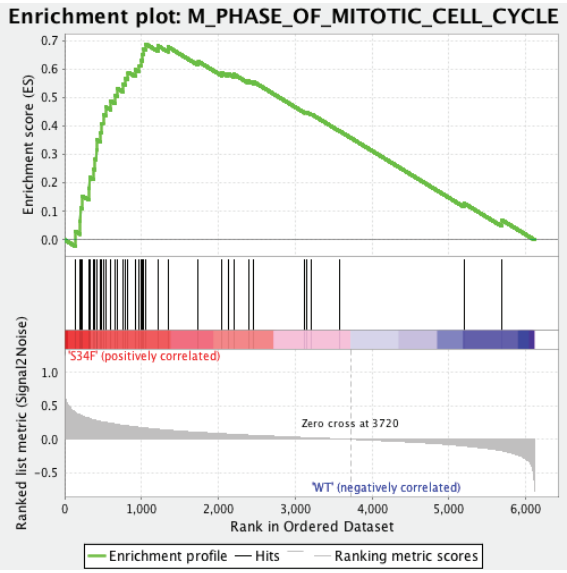


Figure S6: GSEA enrichment analysis in AML samples.

(**A**) GO:0000278 mitotic cell cycle enrichment score. (**B**) GO:0000087 M phase of mitotic cell cycle enrichment score.

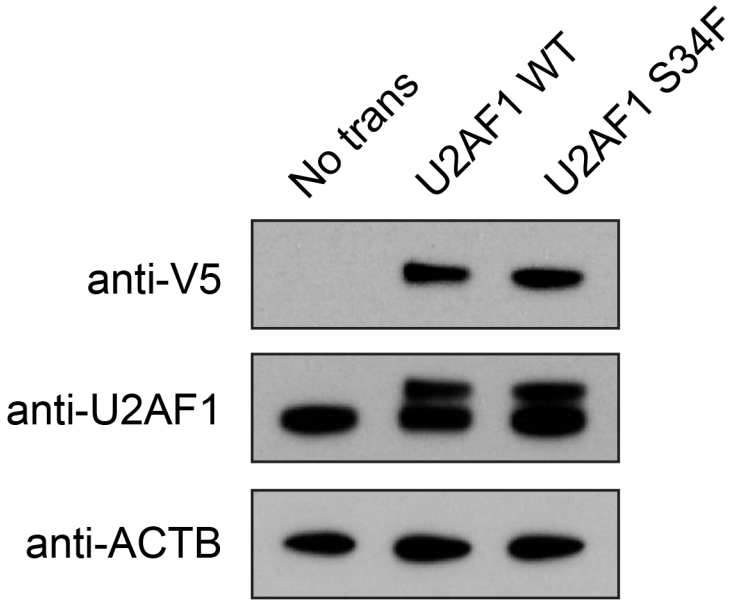


Figure S7: Expression of V5 tagged U2AF1 WT or U2AF1 S34F constructs in 293T cells as determined by western blot

Supporting Tables

Table S1: The Cancer Genome Atlas sample identifiers used in this study. Somatic mutations in splicing factors are indicated.

LUAD, lung adenocarcinoma; LAML, acute myeloid leukemia

TCGA ID	cancer type	U2AF1	RBM10	ZRSR2	U2AF2	SF3B1	PRPF40B	SF1	SF3A1	HNRNPK
TCGA-55-7727	LUAD	p.S34F	p.Q416L	WT	WT	WT	WT	WT	WT	WT
TCGA-64-1680	LUAD	p.S34F	WT	WT	WT	WT	WT	p.Y450*	WT	WT
TCGA-49-6744	LUAD	p.S34F	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-55-7903	LUAD	p.S34F	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-50-5941	LUAD	p.S34F	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7145	LUAD	p.S34F	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-49-4505	LUAD	p.S34F	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-49-4488	LUAD	p.S34F	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-55-7815	LUAD	WT	p.D568fs	WT	WT	WT	WT	WT	WT	WT
TCGA-05-4424	LUAD	WT	p.E177*	WT	WT	WT	WT	WT	WT	WT
TCGA-05-4418	LUAD	WT	p.E559*	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7158	LUAD	WT	p.E800*	WT	WT	WT	WT	WT	WT	WT
TCGA-64-1676	LUAD	WT	p.G153C	WT	WT	p.A959V	WT	WT	WT	WT
TCGA-78-7148	LUAD	WT	p.G168_splice	WT	WT	WT	WT	WT	WT	WT
TCGA-75-6214	LUAD	WT	p.G168_splice	WT	WT	WT	WT	WT	WT	WT
TCGA-55-7281	LUAD	WT	p.G870C	WT	WT	WT	WT	WT	WT	WT
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TCGA-55-6983	LUAD	WT	p.P567fs	WT	WT	WT	WT	WT	WT	WT
TCGA-05-4403	LUAD	WT	p.Q155*	WT	WT	WT	WT	WT	WT	WT
TCGA-49-4494	LUAD	WT	p.Q192_splice	WT	WT	WT	WT	WT	WT	WT
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TCGA-78-7537	LUAD	WT	p.R163fs	WT	WT	WT	WT	WT	WT	WT
TCGA-73-7498	LUAD	WT	p.R387_splice	WT	WT	WT	WT	WT	WT	WT
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TCGA-75-6211	LUAD	WT	WT	WT	p.A131S	WT	WT	WT	WT	WT
TCGA-55-6543	LUAD	WT	WT	WT	p.F4Y	WT	WT	WT	WT	WT
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TCGA-97-7554	LUAD	WT	WT	WT	p.P361P	WT	p.R410L	WT	WT	WT
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TCGA-75-5147	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
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TCGA-75-6205	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-75-6207	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-75-6212	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-75-7025	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-75-7027	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-75-7030	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-75-7031	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7143	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7147	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7149	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7150	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7152	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7153	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7154	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7155	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7156	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7159	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7160	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7161	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7162	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7163	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7167	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7535	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7536	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7540	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7542	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-78-7633	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-80-5607	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-80-5608	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-86-6562	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-86-7713	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-86-7714	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-91-6828	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-91-6829	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT

TCGA-91-6835	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-91-6840	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-91-6847	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-91-6849	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-93-7347	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-93-7348	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-95-7039	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-95-7043	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-95-7567	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-95-7947	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-95-7948	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-97-7552	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-97-7553	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-97-7937	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-97-7941	LUAD	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2866	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2899	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2897	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2904	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2871	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2856	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2819	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2985	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2828	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2982	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2816	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2976	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2908	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2885	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2886	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2994	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2824	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2920	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2837	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2978	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2879	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2931	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2932	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2844	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT

TCGA-AB-2872	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2839	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2948	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3011	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2956	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2817	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2806	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2823	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2973	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2930	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2896	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2895	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2942	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2928	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2833	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2983	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2835	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2836	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2841	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2842	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2870	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2936	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3007	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3001	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3000	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2941	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2939	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2815	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2840	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2807	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2858	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2848	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2940	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2988	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3008	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2998	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2813	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2884	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2918	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT

TCGA-AB-2846	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2925	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2818	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2959	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2938	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2849	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2917	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2914	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2810	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2853	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2995	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2933	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2834	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2820	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2909	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2898	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2992	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2868	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2934	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2855	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2949	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2987	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2980	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2991	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2967	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2913	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2867	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2865	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2955	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2891	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2943	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2822	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2966	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2946	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2979	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2874	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2877	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2808	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2900	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT

TCGA-AB-2903	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2984	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2999	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3012	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2863	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2965	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2971	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2972	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2875	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2993	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2990	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2825	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2880	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2964	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2919	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3009	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2963	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2921	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2857	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2935	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2873	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2924	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2838	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3005	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3002	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2826	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2911	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2862	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2975	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2910	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2888	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2970	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2803	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2832	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2814	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2869	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2944	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2950	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2927	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT

TCGA-AB-2916	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2889	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2901	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2845	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2969	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2854	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-3006	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2887	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2805	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2860	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2986	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2812	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2811	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2915	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2881	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2890	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2981	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2830	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2954	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT
TCGA-AB-2952	LAML	WT	WT	WT	WT	WT	WT	WT	WT	WT

Table S2: Splicing factors reported to be significantly altered in previous studies where *U2AF1* is somatically mutated.

Splicing Factor	**Reference**
HNRNPK	[2]
PRPF40B	[3]
RBM10	[4]
SF1	[3]
SF3A1	[3]
SF3B1	[3]
SRSF2	[3]
U2AF2	[3]
ZRSR2	[3]

Table S3: Mitotic cell cycle genes that show differential splicing in the presence of the *U2AF1* S34F/Y mutation.

Gene	GO:0000278 :mitotic cell cycle	GO:0000087 :M phase of mititic cell cycle	U2AF1 S34F/Y-associated differential splicing in AML	U2AF1 S34F-associated differential splicing in lung adenocarci-noma
ANAPC1	x	x	x	
ANAPC10	x	x	x	
ANAPC5	x	x	x	
ANLN	x		x	
BLZF1	x	x		x
BUB3	x	x	x	
CCNH	x		x	
CDC27	x	x	x	
CENPO	x	x	x	
CEP192	x		x	
CHEK2	x		x	
CKAP5	x	x	x	
DDX11	x		x	
EZH2	x		x	
FAM111A	x	x	x	
FGFR1OP	x		x	
ITGB3BP	x	x	x	
LIG1	x		x	
MNAT1	x		x	
NAE1	x			x
NUSAP1	x		x	
OPTN	x			x
PCM1	x		x	
RBL1	x		x	
SEC13	x	x	x	
SFI1	x		x	
SH2B1	x		x	
TERF1	x		x	
TFDP1	x		x	
TFDP2	x		x	
WAPAL	x	x	x	

Table S4: Cancer Gene Census genes differentially spliced in the presence of a *U2AF1* S34F/Y mutation.

Gene	**U2AF1 S34F/Y-associated differential splicing in AML**	**U2AF1 S34F-associated differential splicing in lung adenocarcinoma**
ATRX	x	
BCL9		x
BCOR	x	
CHCHD7	x	x
CHEK2	x	
CTNNB1	x	x
EIF4A2	x	
EZH2	x	
FGFR1OP	x	
FIP1L1	x	
FLT3	x	
KDM6A	x	
NCOA2	x	
NIN	x	
PCM1	x	
PDGFRA	x	
PICALM	x	x
RAD51L1		x
RALGDS	x	
U2AF1		x
WHSC1	x	

Table S5: Taqman assays (Life Technologies) used for quantitative RT-PCR of splicing events in *CHCHD7, CHEK2, CTNNB1, KARS,* and, *PTBP1*.

Gene	Target	AssayID
CHCHD7	constitutive	Hs00225599_m1
CHCHD7	inclusion isoform	Hs03044402_m1
CHEK2	constitutive	Hs01007281_m1
CHEK2	inclusion isoform	custom
CTNNB1	constitutive	Hs00991811_m1
CTNNB1	inclusion isoform	Hs00991812_g1
KARS	constitutive	Hs00271471_m1
KARS	inclusion isoform	custom
PTBP1	constitutive	Hs00738538_g1
PTBP1	inclusion isoform	Hs00914697_g1

References

1. Przychodzen B, Jerez A, Guinta K, Sekeres MA, Padgett R, et al. (2013) Patterns of missplicing due to somatic U2AF1 mutations in myeloid neoplasms. Blood. doi:10.1182/blood-2013-01-480970.

2. The Cancer Genome Atlas Research Network (2013) Genomic and Epigenomic Landscapes of Adult De Novo Acute Myeloid Leukemia. N Engl J Med. doi:10.1056/NEJMoa1301689.

3. Yoshida K, Sanada M, Shiraishi Y, Nowak D, Nagata Y, et al. (2011) Frequent pathway mutations of splicing machinery in myelodysplasia. Nature 478: 64–69. doi:10.1038/nature10496.

4. Imielinski M, Berger AH, Hammerman PS, Hernandez B, Pugh TJ, et al. (2012) Mapping the hallmarks of lung adenocarcinoma with massively parallel sequencing. Cell 150: 1107–1120. doi:10.1016/j.cell.2012.08.029.