Supplemental Data

Table S1. Missing proportion of analyzed data

Variables	Missing proportion
Sex	0
Race	0.0151
Isotype	0
Serum light chain	0.0012
Urine light chain	0.4698
Plasma cell percentage (by puncture)	0.0395
Plasma cell percentage (by biopsy)	0.0616
ALBUMIN	0.0012
B2M	0.0035
LDH	0.0035
CREATININE	0.0047
CRP	0.0035
Hb	0.0035
Platelets	0.0012
Monocytes	0
Lymphocytes	0
Serum M protein	0.0209
Urine M protein	0.0058
Ca	0.0012
t(4;14)	0
t(14;16)	0
t(14;20)	0
del 1p	0
+1q21	0
del 17p	0

Table S2. Patient information at diagnosis before and after imputation

tim	Original data	Data after imputation
Sex, n (%)		
Female	335 (39)	335 (39)
Male	525 (61)	525 (61)
Race, n (%)		
Asian	3 (0)	3 (0)

Africa American	101 (12)	101 (12)
Native American	2 (0)	2 (0)
Pacific Islander	1 (0)	1 (0)
Caucasian American	740 (86)	753 (88)
NA	13 (2)	
Isotype, n (%)		
Biclonal Disease	2 (0)	2 (0)
Free Light Chain	152 (18)	152 (18)
IgA	177 (21)	177 (21)
IgD	9 (1)	9 (1)
IgG	506 (59)	506 (59)
IgM	3 (0)	3 (0)
Nonsecretory	11 (1)	11 (1)
Serum light chain, n (%)		
Kappa	550 (64)	550 (64)
Kappa + Lambda	1 (0)	1 (0)
Lambda	299 (35)	300 (35)
None	9 (1)	9 (1)
NA	1(<1)	0
Urine light chain, n (%)		
Kappa	223 (26)	435 (51)
Kappa + Lambda	2 (0)	4 (0)
Lambda	142 (17)	246 (29)
None	89 (10)	175 (20)
NA	404(47)	0
Plasma cell percentage (by puncture), Median (Q1,Q3)	38 (20, 57)	38 (20, 57.62)
Plasma cell percentage (by biopsy), Median (Q1,Q3)	45 (20, 70)	40 (20, 70)
ALBUMIN, Median (Q1,Q3)	3.8 (3.4, 4.2)	3.8 (3.4, 4.2)
B2M, Median (Q1,Q3)	3.7 (2.5, 6.1)	3.7 (2.5, 6.1)
LDH, Median (Q1,Q3)	152 (127, 185)	152 (127, 185)
CREATININE, Median (Q1,Q3)	1 (0.8, 1.28)	1 (0.8, 1.27)
GFR	69.27 (53.74, 84.73)	69.31 (53.9, 84.73)
CRP, Median (Q1,Q3)	4.5 (2.3, 6.6)	4.5 (2.21, 6.6)
Hb, Mean ± SD	11.23 ± 2.03	11.22 ± 2.04
Platelets, Median (Q1,Q3)	219 (171, 268.5)	219 (171, 269)
Monocytes, Median (Q1,Q3)	8.2 (6.3, 10.62)	8.2 (6.3, 10.62)
Lymphocytes, Median (Q1,Q3)	29.4 (21, 38.1)	29.4 (21, 38.1)
SM, Median (Q1,Q3)	2.59 (0.7, 4.27)	2.5 (0.5, 4.2)
UM, Median (Q1,Q3)	25 (0, 732)	18.5 (0, 730.5)
Ca, Median (Q1,Q3)	9.2 (8.8, 9.7)	9.2 (8.8, 9.7)

Table S3. Definition of high and low levels of variables

Variables	high	low
Plasma cell percentage	>=60	
B2M	>=5.5 mg/l	
LDH	>=190 U/L	
Creatinine	>=2 mg/L	
GFR		<60 mL/min/1.73 m^2
CRP	>=8 mg/L	
Hb	>10 g/dl	
Platelets	>=150 *10^9/L	
Monocytes percentage	>8	<2
Lymphocytes percentage	>40	<20
Serum M protein	>=3 g/L	
Urine M protein	>=0.3 g/L	
Calcium	>10.5 mmol/L	<8.5
Age at transplant date	>=65(yr)	

Table S4. Univariable cox regression analysis for progression free and overall survival

		HR for PFS	95% CI for PFS	p-val for PFS	HR for OS	95% CI for OS	p-val for OS
Age	Young	Reference			Reference		
	Old	1.496	[1.257, 1.780]	<0.0001	1.706	[1.408, 2.067]	<0.0001
Sex	Female	Reference			Reference		
	Male	1.166	[0.981, 1.386]	0.0815	1.164	[0.960, 1.411]	0.122
Race	White	Reference			Reference		
	Africa American	0.9396	[0.7215, 1.224]	0.644	1.018	[0.7659, 1.353]	0.903
	others	0.6685	[0.2148, 2.081]	0.487	0.622	[0.1548, 2.495]	0.503
Isotype	Igg	Reference			Reference		

		HR	95% CI	p	HR	95% CI	p
	Free Light Chain	0.9348	[0.7427, 1.177]	0.566	1.154	[0.8973, 1.483]	0.2651
	IgA	1.17	[0.9527, 1.436]	0.134	1.361	[1.087, 1.704]	0.0072
	Others	1.112	[0.6829, 1.812]	0.669	1.591	[0.9588, 2.639]	0.0723
Light	Kappa	Reference			Reference		
	Lambda	1.1607	[0.9763, 1.380]	0.0913	1.3808	[1.1417, 1.670]	0.0009
	Others	0.7108	[0.2940, 1.719]	0.4485	0.8193	[0.3052, 2.199]	0.6924
Urine light	None	Reference			Reference		
	Urine Light kappa or both	1.165	[0.9318, 1.457]	0.1799	1.151	[0.8947, 1.480]	0.274
	Urine Light lambda	1.439	[1.1292, 1.833]	0.0033	1.671	[1.278, 2.184]	0.0002
PCBM	low	Reference			Reference		
	high	1.154	[0.9752, 1.365]	0.0956	1.31	[1.088, 1.576]	0.0044
ALB	Normal (>=3.5)	Reference			Reference		
	low	1.274	[1.062, 1.528]	0.0092	1.407	[1.154, 1.716]	0.0007
B2M	Normal	Reference			Reference		
	High (>=5.5)	1.638	[1.373, 1.953]	<0.0001	1.967	[1.624, 2.382]	<0.0001
LDH	Normal						
	High (>=190)	1.367	[1.129, 1.654]	0.0014	1.586	[1.289, 1.952]	<0.0001
Creatinine	Normal	Reference			Reference		
	High(>=2)	1.575	[1.229, 2.018]	0.0003	1.934	[1.491, 2.508]	<0.0001
GFR	Normal	Reference			Reference		
	Low (<60)	1.378	[1.160, 1.637]	0.0002	1.526	[1.263, 1.844]	<0.0001
CRP	Normal	Reference			Reference		

	High (>=8)	1.364	[1.120, 1.660]	0.002	1.382	[1.109, 1.723]	0.004
Hb	Normal (>10)	Reference			Reference		
	Low	1.613	[1.353, 1.923]	<0.0001	1.76	[1.453, 2.133]	<0.0001
Platelets	Normal	Reference			Reference		
	Low (<150)	1.547	[1.255, 1.907]	<0.0001	1.823	[1.458, 2.279]	<0.0001
Monocytes	Normal	Reference			Reference		
	Low (<2)	1.025	[0.5068, 2.071]	0.946	1.321	[0.6216, 2.807]	0.469
	High (>8)	1.005	[0.8503, 1.189]	0.951	0.95	[0.7890, 1.144]	0.589
Lymphocytes	Normal						
	High	0.9387	[0.7531, 1.170]	0.5739	1.009	[0.7911, 1.288]	0.941
	Low	1.232	[1.005, 1.509]	0.0444	1.401	[1.121, 1.750]	0.003
Serum M protein	Low (<3)	Reference			Reference		
	high	1.133	[0.959, 1.339]	0.141	1.014	[0.8422, 1.221]	0.884
Urine M protein	Low (<0.3)	Reference			Reference		
	high	1.132	[0.9585, 1.337]	0.144	1.303	[1.083, 1.569]	0.0052
Ca	Normal	Reference			Reference		
	High (>10,5)	1.306	[0.9882, 1.726]	0.0606	1.647	[1.232, 2.201]	0.0008
	Low (<8.5)	1.196	[0.9369, 1.527]	0.1508	1.276	[0.9764, 1.667]	0.0743
t(4;14)	No-translocation	Reference			Reference		
	Translocation	1.1064	[0.8673, 1.411]	0.416	1.169	[0.8969, 1.522]	0.248

t(14;16)	No-translocation						
	Translocation	1.624	[1.117, 2.361]	0.0111	1.934	[1.3, 2.876]	0.0011
t(14;20)	No-translocation						
	Translocation	1.627	[1.041, 2.542]	0.0327	1.361	[0.8241, 2.246]	0.229
del 1p	No-del	Reference			Reference		
	Del	1.422	[1.171, 1.728]	0.0004	1.516	[1.224, 1.877]	0.0001
del 17p	No-del	Reference					
	Del	1.857	[1.448 2.380]	<0.0001	2.201	[1.691, 2.865]	<0.0001
+1q	No-gain	Reference					
	Gain	1.583	[1.337, 1.873]	<0.0001	1.635	[1.358, 1.969]	<0.0001

Table S5. Variable differences in R2-ISS low risk stages (I and II)

Variables	Total (n = 190)	Long, OS>10 year (n = 156)	Short, OS <3 year (n = 34)	p
B2M, Median (Q1,Q3)	2.7 (2.1, 3.6)	2.64 (2.07, 3.4)	3.2 (2.47, 4.4)	0.005
Age.at.Tx1, Median (Q1,Q3)	59.09 (50.87, 64.63)	57.63 (49.54, 63.87)	63.21 (59.2, 68.31)	0.001

Table S6. Variable differences in R2-ISS high risk stages (III and IV)

Variables	Total (n = 250)	Long (n = 130)	Short (n = 120)	p
Serum Light, n (%)				0.012
Kappa	147 (59)	86 (66)	61 (51)	
Lambda	102 (41)	43 (33)	59 (49)	
none	1 (0)	1 (1)	0 (0)	
ALBUMIN, Median (Q1,Q3)	3.6 (3.1, 4)	3.7 (3.23, 4.1)	3.5 (3, 3.9)	0.050
LDH, Median (Q1,Q3)	169 (135,	160 (125.25,	183.5 (141.75,	< 0.001

	215.75)	197.25)	232)	
Platelets, Median (Q1,Q3)	203 (151, 255.75)	210 (165.25, 258.75)	197 (127, 254.25)	0.033
Age.at.Tx1, Median (Q1,Q3)	59.87 (52.29, 66.21)	58.84 (51.49, 63.87)	61.58 (54.03, 67.58)	0.015
t(14;16), n (%)				0.029
No-translocation	233 (93)	126 (97)	107 (89)	
Translocation	17 (7)	4 (3)	13 (11)	
del 17p, n (%)				0.002
del 17p	37 (15)	10 (8)	27 (22)	
No_del 17p	213 (85)	120 (92)	93 (78)	