

Supplementary Table 1. CBC parameters of healthy volunteers and MDS patients

	MDS patients		Healthy volunteers		<i>P</i>
	MN	SD	MN	SD	
RBC (T/L)	2.9	0.6	4.6	0.4	****
Hb (g/L)	93.8	18.1	140.2	9.2	****
Hct (%)	28.2	5.4	42.0	2.7	****
MCV (fL)	99.1	12.3	92.2	4.4	****
MCH (pg/cell)	33.0	4.3	30.8	1.6	****
MCHC (g/dL)	33.3	1.0	33.4	0.8	
RDW (%)	19.1	4.5	13.7	0.7	****
PLT (G/L)	154.7	143.8	252.9	48.8	****
MPV (fL)	9.6	1.4	8.7	0.8	****
WBC (G/L)	4.7	3.8	5.8	1.2	****
UWBC (G/L)	4.7	3.8	5.8	1.2	****
% NE	54.4	19.8	55.3	7.3	
% LY	30.6	18.7	31.9	7.1	
% MO	11.2	8.2	8.7	2.1	
% EO	2.6	3.4	3.3	2.3	****
% BA	1.2	1.3	0.8	0.6	
Abs NE (G/L)	2.9	2.9	3.2	0.8	**
Abs LY (G/L)	1.1	1.1	1.8	0.6	****
Abs MO (G/L)	0.5	0.7	0.5	0.1	**
Abs EO (G/L)	0.1	0.1	0.2	0.1	****
Abs BA (G/L)	0.05	0.09	0.03	0.05	
% NRBC	0.4	0.8	0.04	0.1	****
Abs NRBC (G/L)	0.02	0.05	0.002	0.003	****

** : P < 0.01 ; **** : P < 0.0001

Supplementary Table 2. Research parameters of healthy volunteers and MDS patients (MDS-L1S parameters are highlighted in grey)

	MDS patients			Healthy volunteers			P	MDS patients			Healthy volunteers			P			
	MN	SD	MN	SD	MN	SD		MN	SD	MN	SD	MN	SD				
Neutrophils																	
MN-V	152.3	14.0	147.7	5.3	**	MN-V	95.1	6.6	88.2	3.1	****	MN-V	184.5	13.7	171.1	5.8	****
SD-V	22	6.4	16.7	1.0	****	SD-V	16.3	3.6	14.2	0.9	****	SD-V	23.4	4.6	18.3	2.0	****
MN-C	143	6.7	144.7	4.6	**	MN-C	116.1	5.7	115.6	4.1	****	MN-C	123.6	6.2	124.5	4.2	*
SD-C	5.9	2.1	4.5	0.5	****	SD-C	9.6	3.9	7.6	1.0	****	SD-C	6.7	4.5	5.2	0.8	*
MN-MALS	132.6	9.3	140.7	4.4	****	MN-MALS	71.9	7.3	70.6	3.8	****	MN-MALS	88.2	6.1	87.8	3.1	****
SD-MALS	13.1	4.1	10.3	1.2	****	SD-MALS	18.4	3.5	16.5	0.9	****	SD-MALS	12.0	3.1	11.1	0.9	****
MN-UMLS	131.0	10.1	138.8	4.3	****	MN-UMLS	73.1	10.8	69.1	6.7	**	MN-UMLS	97.9	7.6	96.7	4.5	****
SD-UMLS	14.5	4.5	10.8	0.7	****	SD-UMLS	21.7	3.4	20.9	1.5	****	SD-UMLS	13.1	3.9	12.4	1.1	****
MN-LMALS	127.4	10.4	136.0	7.0	****	MN-LMALS	62.8	5.5	63.3	3.0	****	MN-LMALS	74.1	6.3	74.4	3.8	****
SD-LMALS	15.0	3.7	13.0	2.4	****	SD-LMALS	20.3	3.2	18.4	0.8	****	SD-LMALS	14.5	2.5	13.8	1.3	****
MN-LALS	158.4	19.6	165.4	14.5	**	MN-LALS	41.2	4.4	38.9	2.7	****	MN-LALS	86.8	14.7	89.3	14.0	****
SD-LALS	31.2	5.8	28.5	4.6	****	SD-LALS	12.5	2.7	10.6	1.2	****	SD-LALS	24.8	4.9	23.6	4.2	****
MN-AL2	155.0	8.7	153.7	5.2	****	MN-AL2	96.3	7.5	92.4	4.7	****	MN-AL2	156.8	11.1	154.0	7.1	*
SD-AL2	14.2	5.1	10.3	1.3	****	SD-AL2	13.2	3.8	11.1	0.9	****	SD-AL2	15.9	5.6	11.6	1.3	****
Eosinophils																	
MN-V	160.0	16.7	160.2	5.6	****	MN-V	167.0	24.3	155.5	12.0	**	MN-V	8.0	8.2	5.8	3.8	****
SD-V	20.1	7.8	16.7	1.5	****	SD-V	30.0	9.5	26.2	10.5	****	PDW	18.0	1.2	16.7	0.5	****
MN-C	149.3	12.7	146.5	4.9	****	MN-C	133.7	7.3	135.9	4.1	**	EGC	1.3	3.9	0.1	0.1	****
SD-C	9.1	9.4	4.4	1.8	****	SD-C	2.8	1.0	2.1	0.7	****	WNOP	4.5	3.7	6.4	1.5	****
MN-MALS	194.8	11.2	202.7	4.7	****	MN-MALS	138.1	10.4	147.0	5.5	****						
SD-MALS	11.1	4.8	8.4	0.7	****	SD-MALS	7.9	2.4	6.6	2.1	**						
MN-UMLS	203.5	12.1	213.1	5.7	****	MN-UMLS	144.7	13.5	152.4	7.4	**						
SD-UMLS	12.4	5.1	9.2	0.8	****	SD-UMLS	12.2	5.4	11.4	3.5	****						
MN-LMALS	181.6	11.5	187.7	4.4	****	MN-LMALS	125.6	11.0	136.2	5.7	****						
SD-LMALS	12.5	4.9	10.2	0.9	****	SD-LMALS	10.0	5.4	8.8	2.5	****						
MN-LALS	157.9	18.1	162.7	8.6	*	MN-LALS	119.7	17.6	128.8	12.1	****						
SD-LALS	38.5	8.9	40.2	2.7	*	SD-LALS	21.3	6.7	19.8	6.8	****						
MN-AL2	133.4	10.4	126.1	4.4	****	MN-AL2	165.3	17.0	162.1	10.1	****						
SD-AL2	12.6	4.6	10.5	1.8	****	SD-AL2	20.6	6.7	15.8	5.4	****						
Monocytes																	
MN-V	41.0	5.7	46.5	6.3	****	MN-V	122.0	22.8	141.7	12.0	****	MN-V	184.5	13.7	171.1	5.8	****
SD-V	7.5	3.7	6.2	5.7	****	SD-V	50.2	9.1	54.8	5.1	****	SD-V	23.4	4.6	18.3	2.0	****
MN-C	58.5	33.8	83.8	36.8	****	MN-C	108.4	18.7	126.4	15.9	****	MN-C	123.6	6.2	124.5	4.2	****
SD-C	37.6	19.2	23.7	21.0	****	SD-C	38.8	4.1	33.5	3.0	****	SD-C	6.7	4.5	5.2	0.8	*
MN-MALS	93.2	14.0	116.0	25.0	****	MN-MALS	177.5	17.4	203.6	20.7	****	MN-MALS	88.2	6.1	87.8	3.1	****
SD-MALS	18.1	7.7	17.3	14.1	****	SD-MALS	40.2	5.0	42.1	5.0	**	SD-MALS	12.0	3.1	11.1	0.9	****
MN-UMLS	69.4	13.6	88.3	26.0	****	MN-UMLS	171.0	20.3	200.3	10.6	****	MN-UMLS	97.9	7.6	96.7	4.5	****
SD-UMLS	18.3	8.6	15.1	13.4	****	SD-UMLS	45.0	6.2	49.5	3.5	****	SD-UMLS	13.1	3.9	12.4	1.1	****
MN-LMALS	124.2	19.2	151.8	28.8	****	MN-LMALS	186.1	14.9	211.0	9.0	****	MN-LMALS	74.1	6.3	74.4	3.8	****
SD-LMALS	25.4	10.5	25.0	19.8	****	SD-LMALS	39.6	2.9	36.8	2.1	****	SD-LMALS	14.5	2.5	13.8	1.3	****
MN-LALS	110.1	20.6	125.2	26.4	****	MN-LALS	71.0	11.2	90.5	6.8	****	MN-LALS	86.8	14.7	89.3	14.0	****
SD-LALS	26.4	11.1	20.7	17.5	*	SD-LALS	29.9	6.0	35.4	4.4	****	SD-LALS	24.8	4.9	23.6	4.2	****
MN-AL2	97.2	11.3	99.8	11.2	****	MN-AL2	172.3	17.5	183.7	7.2	****	MN-AL2	156.8	11.1	154.0	7.1	*
SD-AL2	10.2	4.3	6.8	6.2	****	SD-AL2	33.2	5.5	35.8	2.7	****	SD-AL2	15.9	5.6	11.6	1.3	****
ECG																	
MN-V	167.0	24.3	155.5	12.0	**	MN-V	122.0	22.8	141.7	12.0	****	MN-V	184.5	13.7	171.1	5.8	****
SD-V	30.0	9.5	26.2	10.5	****	SD-V	50.2	9.1	54.8	5.1	****	SD-V	23.4	4.6	18.3	2.0	****
MN-C	133.7	7.3	135.9	4.1	**	MN-C	108.4	18.7	126.4	15.9	****	MN-C	123.6	6.2	124.5	4.2	****
SD-C	2.8	1.0	2.1	0.7	****	SD-C	38.8	4.1	33.5	3.0	****	SD-C	6.7	4.5	5.2	0.8	*
MN-MALS	138.1	10.4	147.0	5.5	****	MN-MALS	177.5	17.4	203.6	20.7	****	MN-MALS	88.2	6.1	87.8	3.1	****
SD-MALS	7.9	2.4	6.6	2.1	**	SD-MALS	40.2	5.0	42.1	5.0	**	SD-MALS	12.0	3.1	11.1	0.9	****
MN-UMLS	144.7	13.5	152.4	7.4	**	MN-UMLS	171.0	20.3	200.3	10.6	****	MN-UMLS	97.9	7.6	96.7	4.5	****
SD-UMLS	12.2	5.4	11.4	3.5	****	SD-UMLS	45.0	6.2	49.5	3.5	****	SD-UMLS	13.1	3.9	12.4	1.1	****
MN-LMALS	125.6	11.0	136.2	5.7	****	MN-LMALS	186.1	14.9	211.0	9.0	****	MN-LMALS	74.1	6.3	74.4	3.8	****
SD-LMALS	10.0	5.4	8.8	2.5	****	SD-LMALS	39.6	2.9	36.8	2.1	****	SD-LMALS	14.5	2.5	13.8	1.3	****
MN-LALS	119.7	17.6	128.8	12.1	****	MN-LALS	71.0	11.2	90.5	6.8	****	MN-LALS	86.8	14.7	89.3	14.0	****
SD-LALS	21.3	6.7	19.8	6.8	****	SD-LALS	29.9	6.0	35.4	4.4	****	SD-LALS	24.8	4.9	23.6	4.2	****
MN-AL2	165.3	17.0	162.1	10.1	****	MN-AL2	172.3	17.5	183.7	7.2	****	MN-AL2	156.8	11.1	154.0	7.1	*
SD-AL2	20.6	6.7	15.8	5.4	****	SD-AL2	33.2	5.5	35.8	2.7	****	SD-AL2	15.9	5.6	11.6	1.3	****
RUO																	
MN-V	184.5	13.7	171.1	5.8	****	MN-V	122.0	22.8	141.7	12.0	****	MN-V	184.5	13.7	171.1	5.8	****
SD-V	23.4	4.6	18.3	2.0	****	SD-V	50.2	9.1	54.8	5.1	****	SD-V	23.4	4.6	18.3	2.0	****
MN-C	123.6	6.2	124.5	4.2	****	MN-C	108.4	18.7	126.4	15.9	****	MN-C	123.6	6.2	124.5	4.2	****
SD-C	6.7	4.5	5.2	0.8	*	SD-C	38.8	4.1	33.5	3.0	****	SD-C	6.7	4.5	5.2	0.8	*
MN-MALS	88.2	6.1	87.8	3.1	****	MN-MALS	177.5	17.4	203.6	20.7	****	MN-MALS	88.2	6.1	87.8	3.1	****
SD-MALS	12.0	3.1	11.1	0.9	****	SD-MALS	40.2	5.0	42.1	5.0	**	SD-MALS	12.0	3.1	11.1	0.9	****
MN-UMLS	97.9	7.6	96.7	4.5	****	MN-UMLS	171.0	20.3	200.3	10.6	****	MN-UMLS	97.9	7.6	96.7	4.5	****
SD-UMLS	13.1	3.9	12.4	1.1	****	SD-UMLS	45.0	6.2	49.5	3.5	****	SD-UMLS	13.1	3.9	12.4	1.1	****
MN-LMALS	74.1	6.3	74.4	3.8	****	MN-LMALS	186.1	14.9	211.0	9.0	****	MN-LMALS	74.1	6.3	74.4	3.8	****
SD-LMALS	14.5	2.5	13.8	1.3	****	SD-LMALS	39.6	2.9	36.8	2.1	****	SD-LMALS	14.5	2.5	13.8	1.3	****
MN-LALS	86.8	14.7	89.3	14.0	****	MN-LALS	71.0	11.2	90.5	6.8	****	MN-LALS	86.8	14.7	89.3	14.0	****
SD-LALS	24.8	4.9	23.6	4.2	****	SD-LALS	29.9	6.0	35.4	4.4	****	SD-LALS	24.8	4.9	23.6	4.2	****
MN-AL2	156.8	11.1	154.0	7.1	*	MN-AL2	172.3	17.5	183.7	7.2	****	MN-AL2	156.8	11.1	154.0	7.1	*
SD-AL2	15.9	5.6	11.6	1.3	****	SD-AL2	33.2	5.5	35.8	2.7	****	SD-AL2	15.9	5.6	11.6	1.3	****

*: P < 0.05 ; **: P < 0.01 ; ***: P < 0.001 ; ****: P < 0.0001

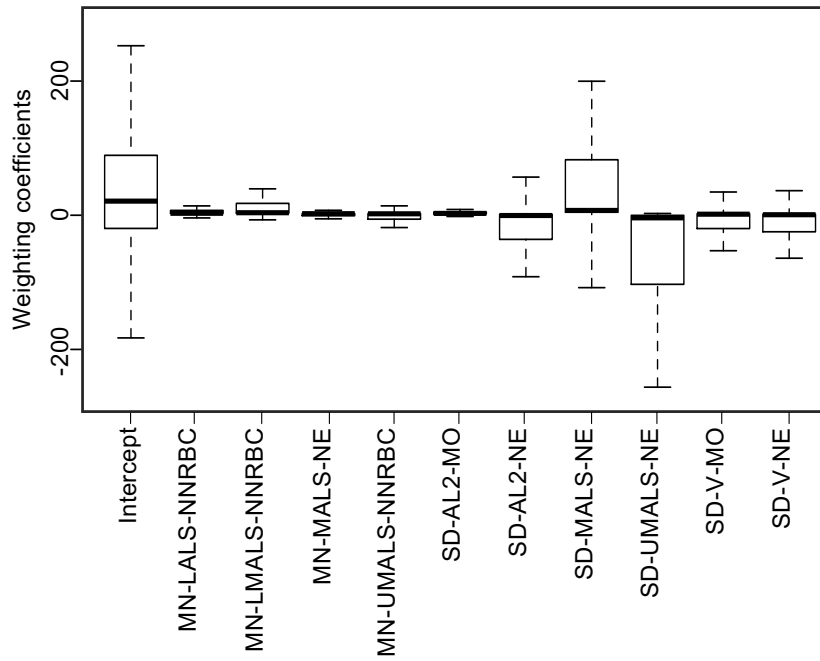
Supplementary Table 3.

MDS-LS and biological characteristics of two external independent cohorts
(MDS patients and healthy controls)

#	MDS patients					#	Healthy controls			
	Hb (g/L)	Plt (G/L)	Ne (G/L)	PB blasts (%)	MDS-LS		Hb (g/L)	Plt (G/L)	Ne (G/L)	MDS-LS
1	92	19	0.1	3	-176.4	26	152	310	3.7	-11.9
2	124	79	1.5	7	-36.6	27	143	276	6.4	0.0
3	113	44	4	0	-34.7	28	155	201	6.9	14.4
4	127	91	1.2	6	-41.6	29	156	156	3.1	8.9
5	100	90	0.7	0	-63.9	30	134	273	3.9	11.8
6	92	130	0.1	0	-57.2	31	139	170	3.1	13.4
7	89	51	1.6	0	-77.2	32	130	201	2.3	3.7
8	129	24	0.7	0	-73.8	33	146	178	3.5	9.6
9	135	23	16	7	-96.1	34	124	232	4.1	13.9
10	80	385	12.3	0	-116.0	35	140	233	5.6	20.2
11	102	248	1.9	0	-21.5	36	147	247	5.2	14.8
12	88	199	4.4	0	-48.5	37	154	295	4.9	11.2
13	79	125	2.3	0	-16.3	38	129	294	5.6	2.2
14	103	116	2.8	0	-5.6	39	161	181	4.6	14.5
15	88	158	1	0	-88.6	40	133	218	4.2	3.4
16	126	62	3.2	0	-45.8	41	136	195	4.7	-5.8
17	134	110	1.8	0	4.3	42	137	167	3.5	-27.3
18	102	36	5.6	0	0.8	43	169	170	4.8	15.6
19	79	146	2.1	0	-46.2	44	137	211	4.9	2.0
20	93	43	0.1	7	-101.8	45	145	158	2.8	18.5
21	71	233	4.5	0	-37.4	46	149	226	4.1	21.1
22	111	644	2.6	0	-98.0	47	133	210	3.3	-3.0
23	95	284	4.7	0	-27.6	48	140	270	7.1	8.5
24	83	276	0.8	1	-95.5	49	148	252	5.6	4.1
25	93	208	0.6	0	-69.2	50	140	313	5.8	2.4
mean	101	153	3.1	1	-58.8	mean	143	222	4.6	7.4
SD	18.9	140.5	3.7	2.5	41.6	SD	11	47.0	1.3	10.4

Supplementary Table 4. Description of parameters

Parameters	Significance	Technology
Conventional parameters		
RBC (T/L)	red blood cells	Coulter principle
Hb (g/L)	hemoglobin	photometry
Hct (%)	hematocrit	calculation
MCV (fL)	mean corpuscular volume	Coulter principle
MCH (pg/cell)	mean corpuscular haemoglobin	calculation
MCHC (g/dL)	mean corpuscular hemoglobin concentration	calculation
RDW (%)	red cell distribution width	calculation
PLT (G/L)	platelets	Coulter principle
MPV (fL)	mean platelet volume	Coulter principle
WBC (G/L)	white blood cells	Coulter principle
UWBC (G/L)	uncorrected white blood cells	Coulter principle
% NE	neutrophils	VCS
% LY	lymphocytes	VCS
% MO	monocytes	VCS
% EO	eosinophils	VCS
% BA	basophils	VCS
% NRBC	nucleated red blood cells	VCS
Research Use Only (RUO)		
LHD	low hemoglobin density	calculation
MAF	microcytic anemia factor	calculation
PDW	platelet distribution width	calculation
EGC	early granulated cells	VCS
WNOP	WBC estimate (corrected) from the NRBC optical channel	VCS
Cell Population Data (CPD)		
MN-V-X, SD-V-X	mean and SD of volume of X	VCS
MN-C-X, SD-C-X	mean and SD of conductivity of X	VCS
MN-UMALS-X, SD-UMALS-X	mean and SD of upper median angle light scatter of X	VCS
MN-LMALS-X, SD-LMALS-X	mean and SD of low median angle light scatter of X	VCS
MN-LALS-X, SD-LALS-X	mean and SD of low angle light scatter of X	VCS
MN-AL2-X, SD-AL2-X	mean and SD of axial light loss of X	VCS
MN-MALS-X, SD-MALS-X	mean and SD of median angle light scatter of X (UMALS + LMALS)	VCS



Median values 18.77 0.23 1.14 -0.36 -0.53 0.10 -3.36 4.78 -7.01 -1.19 -2.03

Supplementary Figure 1: Values of weighting coefficients of the 10 selected parameters and intercept after 10,000 iterations