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Supplementary Table 1: Calibration data for normalisation of analytes. Normalisation factors for each acquisition were calculated by dividing the slope of the respective tumour calibration curve with the slope of the melanoma calibration curve. The response of Mn, Cu, Zn and Fe for each acquisition was divided by the normalisation factor to ensure consistent signal across all acquisitions and reported as normalised counts.

Concentration (ug.g^{-1})				
Standards	**Mn**	**Cu**	**Zn**	**Fe**
A	0.5	5.5	4.2	13.7
B	2.1	7.9	5.3	18.7
C	3.7	8.6	15.0	26.6
D	10.0	15.9	18.1	36.6
E	1.9	24.3	27.9	47.7
F	29.1	51.9	64.5	89.9
Correlation (r^2)				
Tumour	**Mn**	**Cu**	**Zn**	**Fe**
Melanoma	0.9991	0.9948	0.9964	0.9908
Seminoma	0.9977	0.9816	0.9916	0.9653
Mesothelioma	0.9955	0.9959	0.9920	0.9838
Small cell lung cancer	0.9945	0.9830	0.9590	0.9525
Glioblastoma	0.9943	0.9950	0.9709	0.9514
Breast	0.9663	0.9958	0.9969	0.9691
Prostate	0.9995	0.9710	0.9937	0.8965
Normal tissues	0.9926	0.9114	0.9503	0.9425
Slope (counts.s^{-1}/ug.g^{-1})				
Tumour	Mn	**Cu**	**Zn**	**Fe**
Melanoma	26168	2936	4651	17995
Seminoma	22114	2955	5095	19238
Mesothelioma	26583	4261	7030	19835
Small cell lung cancer	20130	3518	5083	19132
Glioblastoma	19234	2971	6735	16818
Breast	12071	1529	3362	7674
Prostate	18007	2213	4877	11341
Normal tissues	16516	2224	4835	10478
Normalisation factor				
Tumour	**Mn**	**Cu**	**Zn**	**Fe**
Melanoma	1	1	1	1
Seminoma	0.85	1.01	1.10	1.07
Mesothelioma	1.02	1.45	1.51	1.10
Small cell lung cancer	0.77	1.20	1.09	1.06
Glioblastoma	0.74	1.01	1.45	0.93
Breast	0.46	0.52	0.72	0.43
Prostate	0.69	0.75	1.05	0.63
Normal tissues	0.63	0.76	1.04	0.58

Supplementary Table 2: Sampling variation in median Mn levels of different sample sizes measured in normal and tumourous tissue sections.

	Source	Sample Size	Mn Level			Ratio (sample/whole section)			Range	Patient
A	Normal liver		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	17500	17820	16270	1.00	1.01	0.93	0.93 - 1.00	# 351
(ii)		500 voxels	16970			0.97				
(iii)		800 voxels (whole section)	17580							
B	Normal cardiac muscle		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	3000	3080	3320	0.95	0.98	1.05	0.95 - 1.05	# 350
(ii)		500 voxels	3100			0.98				
(iii)		700 voxels (whole section)	3150							
C	Normal cortex		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	6850	7050	6950	0.98	1.01	0.99	0.98 - 1.01	# 331
(ii)		500 voxels	6940			0.99				
(iii)		750 voxels (whole section)	6990							
D	Classical seminoma		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		180 voxels	1620	1590	1620	0.98	0.96	0.98	0.96 - 0.98	# 65
(ii)		900 voxels	1620			0.98				
(iii)		2500 voxels (whole section)	1660							
E	Melanoma (pigmented)		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	3050	34120	69820	0.14	1.62	3.32	0.14 - 3.32	# 112
(ii)		500 voxels	3830			0.18				
(iii)		2300 voxels (whole section)	21010							
F	Melanoma (pigmented)		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	15070	14300	13020	1.14	1.08	0.98	0.98 - 1.14	# 122
(ii)		900 voxels	12570			0.95				
(iii)		2000 voxels (whole section)	13270							
G	Melanoma (amelanotic)		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	930	920	880	0.96	0.94	0.90	0.90 - 0.96	# 120
(ii)		900 voxels	920			0.95				
(iii)		2300 voxels (whole section)	980							
H	Breast		sample 1	sample 2	sample 3	sample 1	sample 2	sample 3		
(i)		150 voxels	1840	2340	950	1.06	1.35	0.55	0.55 - 1.35	# 324
(ii)		500 voxels	1940			1.12				
(iii)		2000 voxels (whole section)	1740							

Supplementary Table 3: Median Mn levels in normal organs/tissues from the whole ablated tissue sections. A: Liver, cardiac muscle, pancreas, spleen, and cortex, and their corresponding patient numbers. B: Mn levels in different organs from the same patients where genomic variation is minimal.

A		
Organ/Tissue	**Mn level**	**Patient**
Liver	5610	# 333
	14350	# 342
	17580	# 351
Cardiac muscle	4150	# 349
	2660	# 341
	3150	# 350
Spleen	3610	# 346
	7300	# 347
	1560	# 348
Pancreas	5290	# 340
	16210	# 341
	16380	# 342
Cortex	6990	# 331
	2000	# 332
	4010	# 333
B		
Cardiac muscle	2660	# 341
Pancreas	16210	
Liver	14350	# 342
Pancreas	16380	
Liver	5610	# 333
Cortex	4010	