Figure S1. Hemotoxylin and eosin staining of malignant pleural effusion. A total of 6 representative MPE samples are shown compared with a control. Patient 18050707 MPE displayed numerous cancer cells exhibiting striate chromatin, uneven or irregular nucleoli, abundant cytoplasm, uneven staining, and vesicle-like and well-defined malignant cells. Patient 18051504 MPE displayed clusters of abnormal cells with abnormal nuclei, abundant cytoplasm and uneven staining. Patient 18051602 MPE displayed scattered abnormal cells in mass, with uneven cytoplasm staining and a cloudy cytoplasm, and morphologically malignant clear cells. Patient 18052526 MPE displayed abnormal cells of different sizes, clusters of cells, abnormal nuclei, different shades of cytoplasm and cells with a notably malignant appearance. Patient 18052605 MPE displayed abnormal cells differing in size, including clumpy and scattered cells, large abnormal nuclei, rich cytoplasm, and the morphology of malignant cells was clear. Patient 18062543 MPE displayed clusters of abnormal cells differing in size, with heterogeneous nuclei, uneven cytoplasm coloring and a notably malignant appearance.

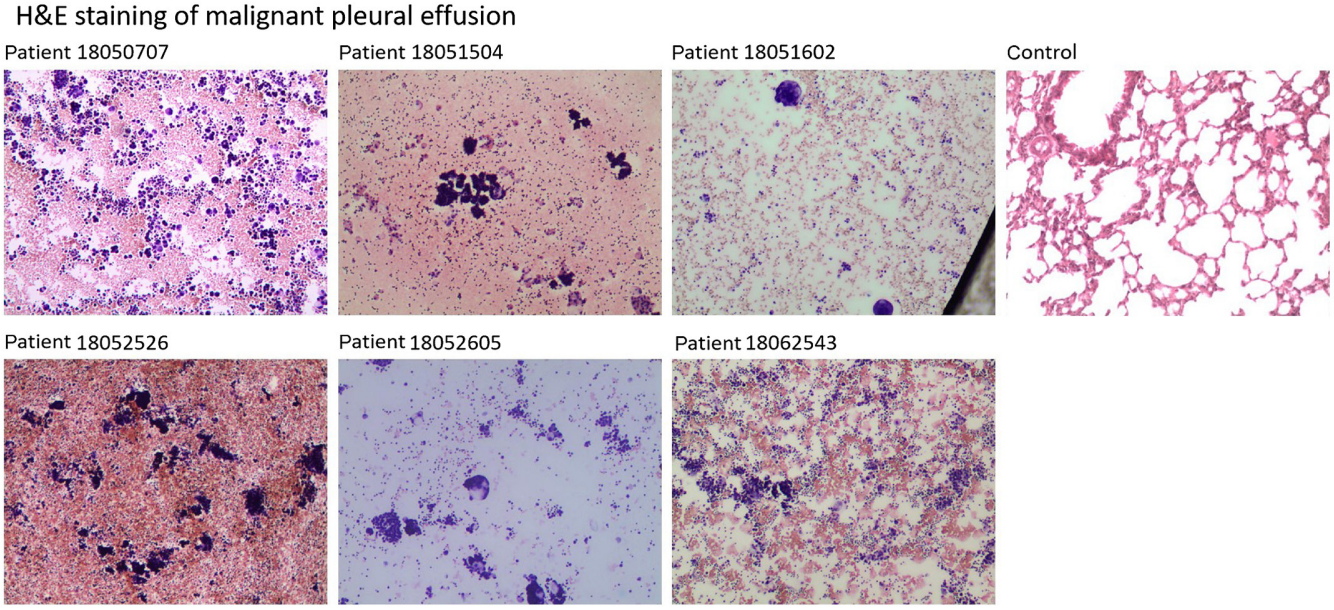

Figure S2. Amplification refractory mutation system PCR result of a gene fusion of ALK + EML4 based on the RNA level from patient 18040535. The Ct values were 9.98 and 16.89.

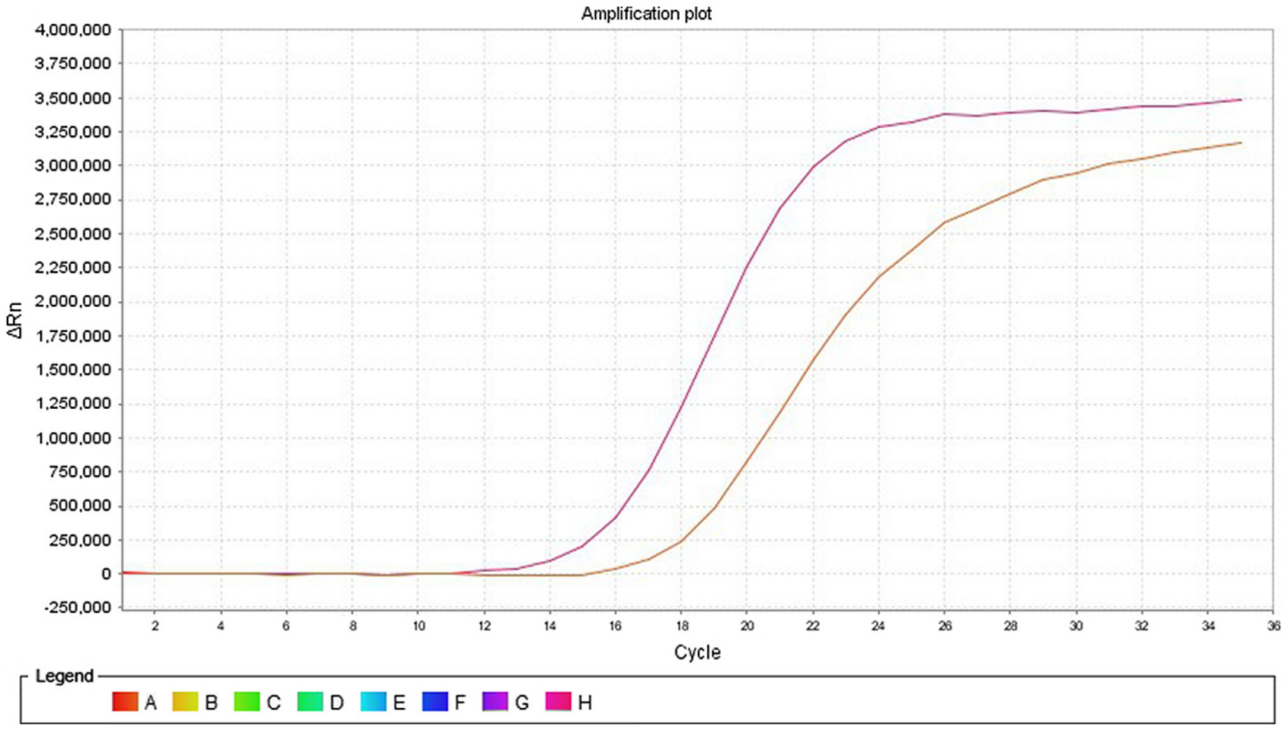

Figure S3. Amplification refractory mutation system PCR result of a BRAF N581I mutation from patient 18042126. The Ct values were 11.86 and 17.36.

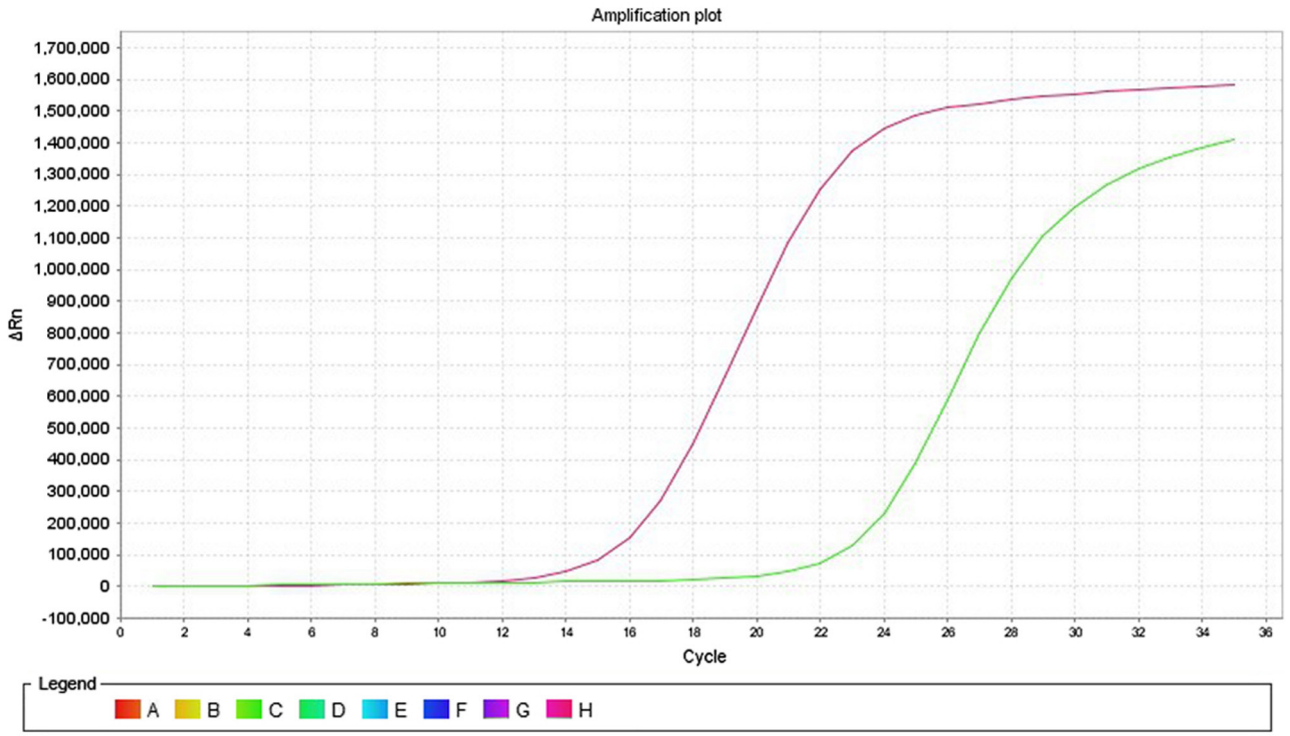

Figure S4. Amplification refractory mutation system PCR result of an EGFR exon 19 deletion mutation from patient 18062314. The Ct values were 13.66 and 16.46.

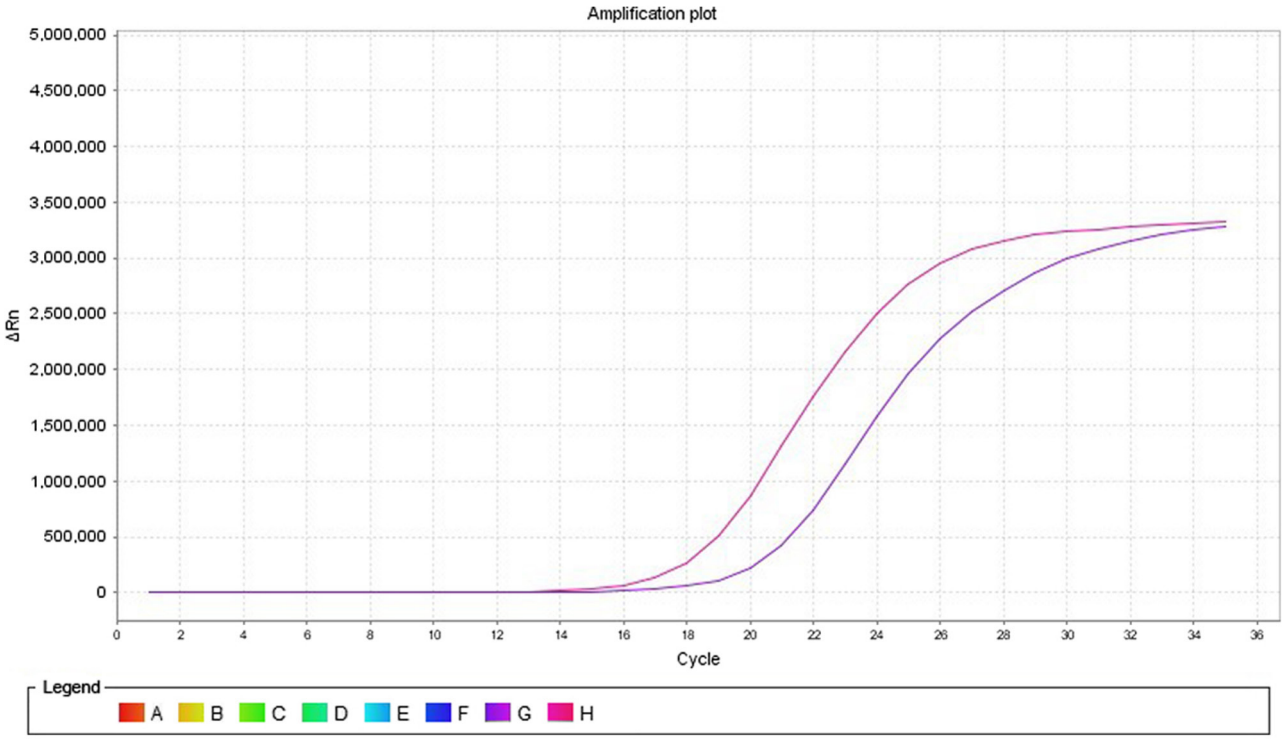

Figure S5. Amplification refractory mutation system PCR result of an EGFR exon 20 insertion mutation from patient 18011709. The Ct values were 11.66 and 20.12.

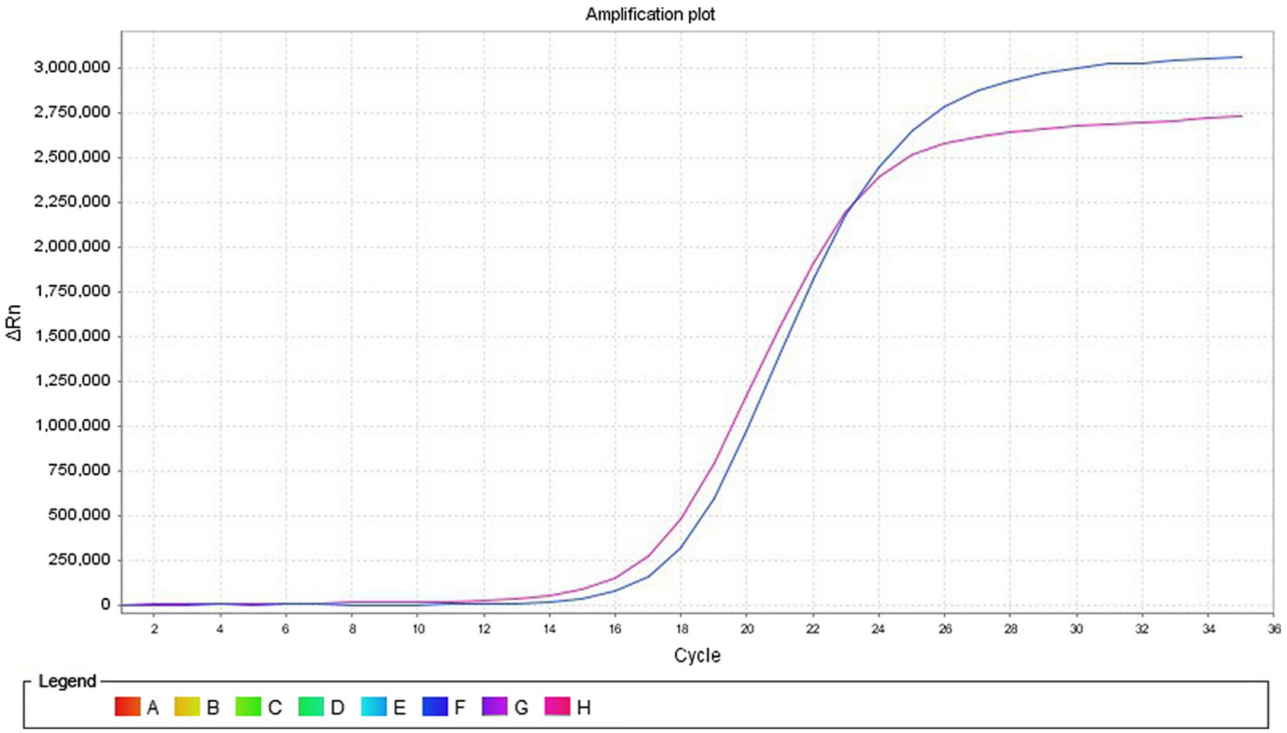

Figure S6. Amplification refractory mutation system PCR result of an EGFR G719A mutation from patient 18012202. The Ct values were 14.71 and 17.02.

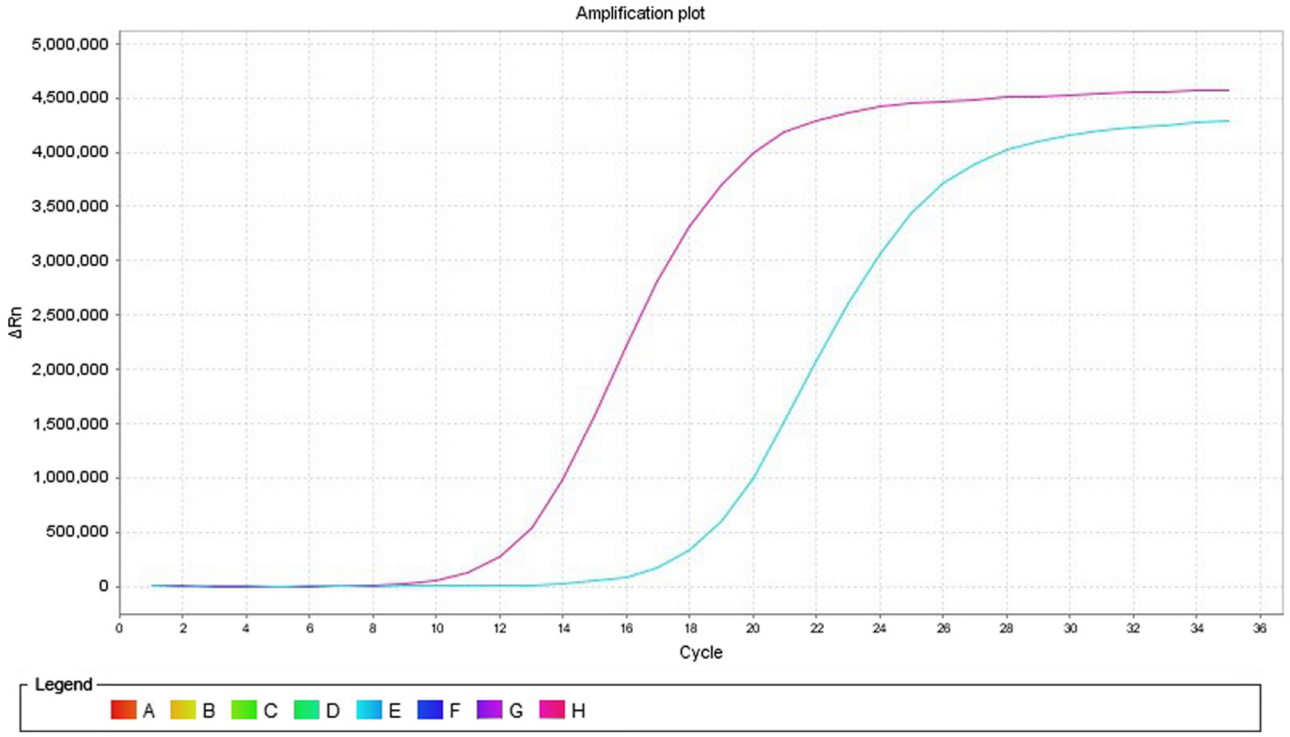

Figure S7. Amplification refractory mutation system PCR result of a KRAS G12S mutation from patient 18060717. The Ct values were 11.85 and 18.26.

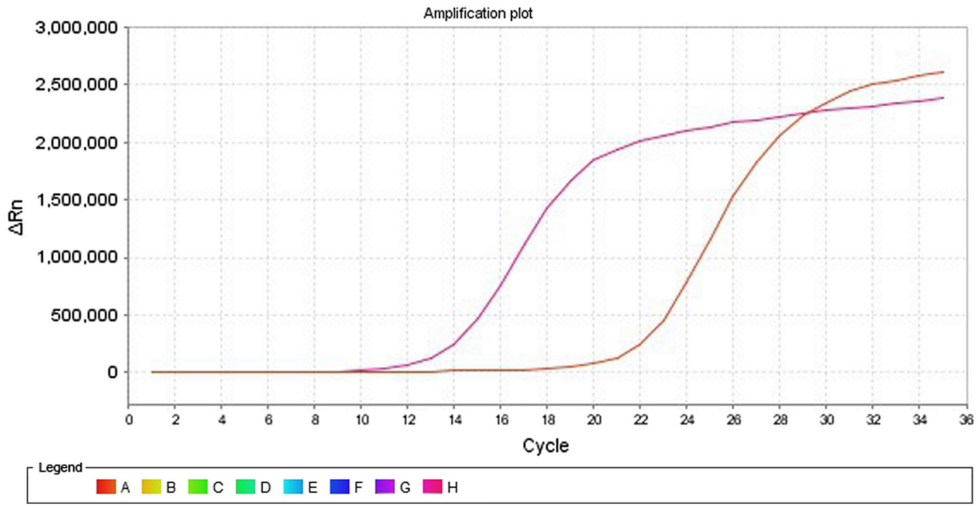

Figure S8. Amplification refractory mutation system PCR result of an EGFR L858R mutation from patient 18050707. The Ct values were 12.96 and 13.56.

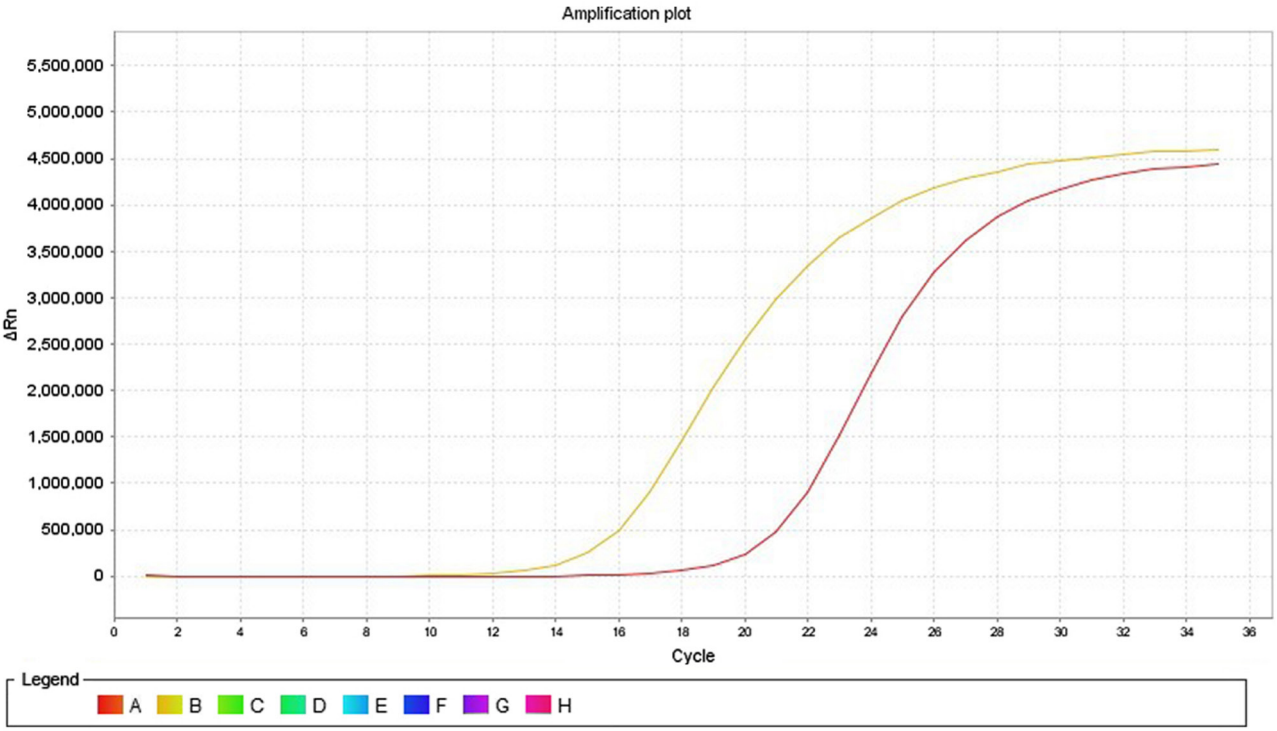

Figure S9. Amplification refractory mutation system PCR result of an EGFR L861Q mutation from patient 18011513. The Ct values were 12.22 and 15.64.

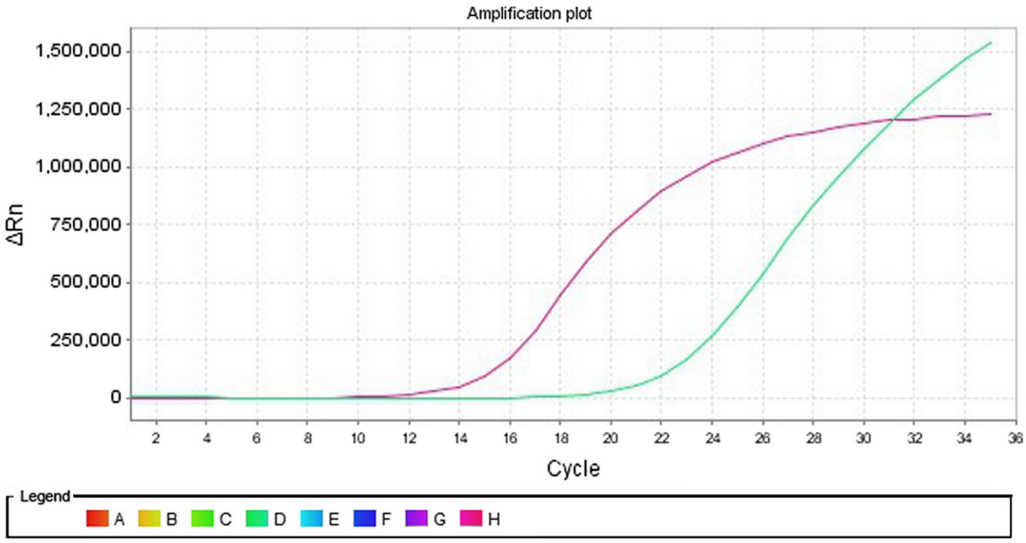

Figure S10. Amplification refractory mutation system PCR result of an EGFR T790M mutation from patient 18051017. The Ct values were 9.36 and 14.01.

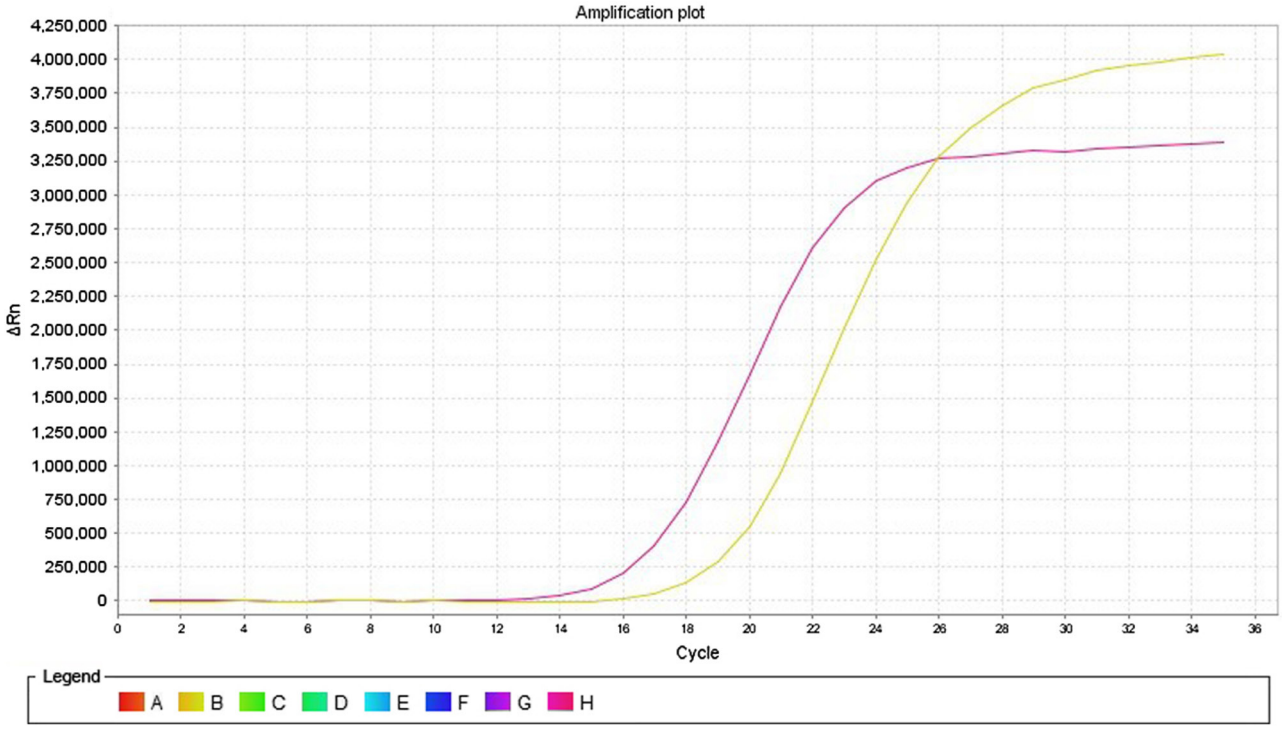

Table SII. NGS results of 108 patients with MPE.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
171213021	M	AC	68													1													1	1	1	1							2	1
171221062	F	AC	39										2		1														1		2	2							1	1
171223032	M	AC	52		1								1			1	1							1	L858R						5								
171226092	F	AC	54		1								2							1	L747_A750del								1		2								1
171230033	M	LC	65										1			1	1												1			2								
180106013	F	AC	60										1																1		3								1
180115132	M	NA	60										3											1	L861Q				2		2	2							1
180117091	M	AC	45																			1	D770_N771insT															1	
180122022	F	NA	75										1		1	2		1	G719A					1	L861Q				2			3							
180123032	M	AC	74										2																		3								
180123052	M	AC	68													1								1	L858R				1		3								
180129052	M	AC	68												1									1	L858R							3								
180130063	M	AC	75										2		1														1	1		4								
180131152	F	AC	68										6		1		1							1	L858R				1		2	4	1						1	1
180201142	M	AC	44										4							1	E746_A750del											4								
180201153	F	LC	86										5							1	L747_S752del	1							1	1		3								

Table SII. Continued.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
180202 15	F	AC	50		1								3			1	2	1				1									1	4								
180203 17	M	LC	80										2				1												1			2								
180205 03	F	LC	80										2				2			1	E746_A750del											2								
180205 14	M	AC	64										4																1	1		5								
180212 11	M	NA	84										2			1	1															2								1
180213 13	M	Pleural effusion	80										1				2							1	L858R				1			2							1	
180226 18	M	LC	65										4				1												1			5							1	
180227 04	F	LC	55										1				3			1	E746_A750del								1	1		3								
180303 04	M	AC	71										1											1	L858R							1								
180305 05	F	LC	70																													1								
180305 07	F	AC	69																	1	E746_A750del											1								
180305 11	F	AC	72		1								1		1	1								1	L858R					2								1	
180306 01	F	NA	74		1								2			1	1	1		1	E746_A750del	2	C797S/T790M						3	1	5				3				2
180310 15	F	NA	80										3							1	E746_A750del								1		1	1								
180311 06	M	LC	68										1		1	1																4	2	N581I						

Table SII. Continued.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
180313102	M	AC	50		1								2					1						1	L858R				3		8									1
180314102	F	AC	56													1								1	L858R				1				1							
180317242	F	AC	74													1		1											2	2	2									
180319022	M	LC	55										6					1											6	2		4								
180321092	F	AC	41										6				2					2	T790M	1	L858R				2			6			2				
180323052	F	LC	50										4			2	5	2	G719S			1	T790M	1	L861Q			2	2		3			1				3		
180324062	M	LC	81		1								5				6	1				1		1	L858R				3	1	2	3							1	1
180324232	M	AC	57										2		4	2	4			1	E746_A750del					1			9	6			2		1				2	1
180324292	M	NSCLC	84										2		6	6	4	1								4			6	6	7	1	2		3				1	2
180326302	M	AC	61										4		1	1		1												1										
180402132	F	AC	69												1	1								1	L858R															
180402142	M	AC	63																			1	T790M	1	L858R				1						1				
180403102	M	NSCLC	71			1							1			2						1		1	L858R				1										1
180404022	F	AC	59																	1	L747_T751del	1																	
180405262	F	NA	77										4			1				1	E746_A750del	1							1	1	7								1
180405312	F	LC	71										2			1	2	1				1		1	L858R				5	1									
180405352	M	LC	77	1									5				1												2	1		2							

Table SII. Continued.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
18040602	M	LC	82										3		1			1											1			2								
18040608	F	LC	56										1				1			1	E746_A750del								1	1		2								
18040613	M	AC	58										2		1	1								1	L858R				7										1	
18040902	F	AC	60										1			2	1			1	E746_R748del								1	2		1								
18041208	F	AC	44										2				1	1											1			2								
18041427	F	LC	86																					1	L858R				1				1							
18041838	F	LC	60										1																1											
18041906	F	LC	34									1	1									1													1					
18042027	M	AC	56													1				1	E746_S752>V								3	1										
18042126	M	AC	83		1								2			1											1	2		6		2	N581I			1	G12D		1
18042130	F	AC	76		1								2																	3									1
18042302	F	LC	65																										3	2									
18042305	F	AC	39	1									3																2			1								
18042323	M	LC	77										1			1								1	L861Q				2	1			1							
18042722	F	AC	83														1							1	L858R								1							
18042813	F	AC	69																					1	L858R										1					
18042830	F	AC	73										2		7	3	5												5	4		1	5		6		2	A146T	4	

Table SII. Continued.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1804 2906	M	LC	58																																				1	
1805 0418	M	LC	55										5		1	1	1			1	E746_A750del											2			2				1	
1805 0508	M	AC	69										1		1	1	1										1			3							1		2	
1805 0707	F	AC	82										1		3		2							1	L858R				1			1	1		1			4	
1805 0730	F	AC	62										2				2			1	L747_P753>S								1	1					1			2	
1805 1017	F	AC	57										6			1	4			1	E746_A750del	1	T790M						1			3				1			4
1805 1214	M	LC	72												1																								
1805 1404	M	LC	68										1		1	1	1			1	E746_A750del									2			1		1				
1805 1504	F	AC	66	1									1		1	1															1								
1805 1602	M	AC	55										9				6	1		1	E746_S752>V									4	3		9			1		1	
1805 1701	M	AC	62										6			1	4	1						1	L858R					5	2		7			1		1	
1805 1724	F	AC	89										7	M774_A775insAYVM			8	2												4	1		8					1	
1805 1814	F	NA	76										9				1			1	E746_A750del									2		2	5	1				1	6
1805 2214	M	AC	70										7			1	5							1	L858R					4		1	4					1	2

Table SII. Continued.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
18052328	M	NSC LC	69										7			1	5			1	E746_S752>V								4	1		3							
18052518	F	AC	62										2	M774_A775ins AYVM	4	1	1												1			1			1		1	G13C	6	
18052521	F	AC	39	1									2				2												1			1	1						1	
18052526	F	AC	65										6		1		1												3			1							4	
18052530	F	LC	80										7		3		2												2			2	1		2				1	
18052605	M	AC	74										4			2	2												1			4								
18052624	M	Pleural effusion	76										4			1	1												2			3								
18052625	F	LC	55										3				3							1	L858R				2			5							1	
18052802	F	AC	80										3		1		2			1	E746_A750del								1	1		6								
18060504	F	AC	40													1				1	T751_E758del																			
18060513	M	AC	71																					1	L858R															
18060717	M	NA	71																																		1	G12S		
18060732	M	AC	53												1																		1							
18060821	F	AC	82										3				1															2								
18061109	F	LC	69										3			1	6			1	E746_A750del	1							1			3			1				3	

Table SII. Continued.

A	B	Subtype	C	D	E	F1	G	H	I	J	K	L	M1	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC1	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1806 1120	F	AC	86										7				6							1	L858R				2			3			1 E5 45K			1	
1806 1121	M	AC	66										7				3												2			3						1	
1806 2314	F	AC	83										15				1			1	E746_A750del							1	1		5							
1806 2317	M	AC	62										3				2					1	T790M	1	L858R				1		2	4							1
1806 2543	F	Lung cancer	71													1				1	E746_A750del																		
1806 2601	M	AC			1								2		2							1	L798I	1	L858R								1						2	
1807 0609	F	AC	45	1									5		2	1	2												1						1				2	
1807 0713	M	AC	67										4			1	2												2											
1807 0901	F	LC	64												1					1	L747_T751del												1						2	
1807 0904	NA	NA											1			1				1	E746_A750del	1	T790M									3							
1807 0908	M	AC	76										1			1								1	L858R								1		1				1	
1807 0919	F	AC	30																														1							
1807 1002	F	AC	55										1											1	L858R								2							
1807 1006	M	AC	88		1								1																				2							

NGS, next generation sequencing; MPE, malignant pleural effusion. Table SII. Results of NGS, 'lung cancer' means NSCLC, unconfirmed if adenocarcinoma. 'adenocarcinoma' means lung subtype adenocarcinoma. The meanings of capital letters in line 1 are: A, No. of patients; B, gender; C, age; D, ALK fusion; E, BIM (2903bp deletion); F, femal; F1, EGFR amplification; G, ERBB2 amplification; H, FGFR1 amplification; I, MET (exon14 deletion); J, MET amplification; K, RET fusion; L, ROS1 fusion; M, male; M1, ERBB2 other mutation; N, ERBB2 special mutation; O, MET other mutation; P, TP53 mutation; Q, ALK other mutation; R, EGFR exon 18 mutation; S, EGFR exon18 special mutation; T, EGFR exon 19 mutation; U, EGFR exon19 special mutation; V, EGFR exon 20 mutation; W, EGFR exon 20 special mutation; X, EGFR exon 21 mutation; Y, EGFR exon 21 special mutation; Z, DDR2 mutation; AA, NRAS mutation; AB, HRAS mutation; AC, adenocarcinoma; AC1, EGFR other mutation; AD, RET other mutation; AE, PTEN mutation; AF, AKT1 mutation; AG, BRAF mutation; AH, BRAF special mutation; AI, PIK3CA mutation; AJ, PIK3CA special mutation; AK, KRAS mutation; AL, KRAS special mutation; AM, ROS1 other mutation; AN, FGFR1 other mutation; LC, lung cancer. The numbers in lists D-AN indicate the number mutations observed at each site. NA, not available.