

Table 1: List of oligonucleotide primers used in 41 conventional multiplex* PCR assays for pneumococcal serotype deduction of 70 serotypes

Primers**	GenBank accession no.	Primer sequence (5'-3')	Gene	Nucleotide position	Product size (bp)	Reference
1-f	CR931632	CTC TAT AGA ATG GAG TAT ATA AAC TAT GGT TA	wzy	9935	280	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
1-r		CCA AAG AAA ATA CTA ACA TTA TCA CAA TAT TGG C		10181		
2-f	CR931633	TAT CCC AGT TCA ATA TTT CTC CAC TAC ACC	wzy	10271	290	Da Gloria Carvalho <i>et al.</i> 2010, J. Clin. Microbiol. 48: 1611-1618
2-r		ACA CAA AAT ATA GGC AGA GAG AGA CTA CT		10531		
3-f	CR931634	ATG GTG TGA TTT CTC CTA GAT TGG AAA GTA G	gal U	9020	371	
3-r		CTT CTC CAA TTG CTT ACC AAG TGC AAT AAC G		9360		
4-f	CR931635	CTG TTA CTT GTT CTG GAC TCT CGA TAA TTG G	wzy	9596	430	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
4-r		GCC CAC TCC TGT TAA AAT CCT ACC CGC ATT G		9995		
5-f	CR931637	ATA CCT ACA CAA CTT CTG ATT ATG CCT TTG TG	wzy	6123	362	
5-r		GCT CGA TAA ACA TAA TCA ATA TTT GAA AAA GTA TG		6450		
6A/6B/6C/6D*-f	CR931639	AAT TTG TAT TTT ATT CAT GCC TAT ATC TGG	wci P	8656	250	
6A/6B/6C/6D-r		TTA GCG GAG ATA ATT TAA AAT GAT GAC TA		8877		
6C/6D-f	EU714777.1	CAT TTT AGT GAA GTT GGC GGT GGA GTT	wci Nbeta	1441	727	Carvalho <i>et al.</i> 2009, J. Clin. Microbiol. 47: 557-559
6C/6D-r		AGC TTC GAA GCC CAT ACT CTT CAA TTA		2141		
7C/7B/40-f	CR931642	CTA TCT CAG TCA TCT ATT GTT AAA GTT TAC GAC GGG A	wcw L	9438	260	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
7C/7B/40-r		GAA CAT AGA TGT TGA GAC ATC TTT TGT AAT TTC		9665		
7F/7A-f	CR931643	TCC AAA CTA TTA CAG TGG GAA TTA CGG	wzy	14683	599	Da Gloria Carvalho <i>et al.</i> 2010, J. Clin. Microbiol. 48: 1611-1618
7F/7A-r		ATA GGA ATT GAG ATT GCC AAA GCG AC		15256		
8-f	CR931644	GAA GAA ACG AAA CTG TCA GAG CAT TTA CAT	wzy	11193	201	
8-r		CTA TAG ATA CTA GTA GAG CTG TTC TAG TCT		11364		
9N/9L-f	CR931647	GAA CTG AAT AAG TCA GAT TTA ATC AGC	wzx	11948	516	Dias <i>et al.</i> 2007, J. Med. Microbiol. 56: 1185-1189
9N/9L-r		ACC AAG ATC TGA CGG GCT AAT CAA T		12439		
9V/9A-f	CR931648	GGG TTC AAA G TC AGA CAG TG A ATC TTA A	wzy	9966	816	Da Gloria Carvalho <i>et al.</i> 2010, J. Clin. Microbiol. 48: 1611-1618
9V/9A-r		CCA TGA ATG A AA TCA ACA TT G TCA GTA GC		10753		
10A- f	CR931649	GGT GTA GAT TTA CCA TTA GTG TCG GCA GAC	wcr G	12423	628	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
10A-r		GAA TTT CTT CTT TAA GAT TCG GAT ATT TCT C		13020		

10F/10C/33C-f	CR931652	GGA GTT TAT CGG TAG TGC TCA TTT TAG CA	wzx	12403	248	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
10F/10C/33C-r		CTA ACA AAT TCG CAA CAC GAG GCA ACA		12624		
11A/11D-f	CR931653	GGA CAT GTT CAG GTG ATT TCC CAA TAT AGT G	wzy	11640	463	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
11A/11D-r		GAT TAT GAG TGT AAT TTA TTC CAA CTT CTC CC		12071		
12F/12A/12B/44/46-f	CR931660	GCA ACA AAC GGC GTG AAA GTA GTT G	wzx	14407	376	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
12F/12A/12B/44/46-r		CAA GAT GAA TAT CAC TAC CAA TAA CAA AAC		14753		
13-f	CR931661	TAC TAA GGT AAT CTC TGG AAA TCG AAA GG	wzx	14005	655	Dias <i>et al.</i> 2007, J. Med. Microbiol. 56: 1185-1189
13-r		CTC ATG CAT TTT ATT AAC CG C TTT TTG TTC		14630		
14-f	CR931662	GAA ATG TTA CTT GGC GCA GGT GTC AGA ATT	wzy	7959	189	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
14-r		GCC AAT ACT TCT TAG TCT CTC AGA TGA AT		8119		
15A/15F-f	CR931663	ATT AGT ACA GCT GCT GGA ATA TCT CTT C	wzy	7804	434	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
15A/15F-r		GAT CTA GTG AAC GTA CTA TTC CAA AC		8212		
15B/15C-f	CR931665	TTG GAA TTT TTT AAT TAG TGG CTT ACC TA	wzy	7314	496	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
15B/15C-r		CAT CCG CTT ATT AAT TGA AGT AAT CTG AAC C		7779		
16F-f	CR931668	GAA TTT TTC AGG CGT GGG TGT TAA AAG	wzy	11679	717	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
16F-r		CAG CAT ATA GCA CCG CTA AGC AAA TA		12371		
17F-f	CR931670	TTC GTG ATG ATA ATT CCA ATG ATC AAA CAA GAG	wci P	10484	693	Pimenta <i>et al.</i> 2009. J. Clin. Microbiol. 17: 2353-2354
17F-r		GAT GTA ACA AAT TTG TAG CGA CTA AGG TCT GC		11145		
18C/18F/18B/18A-f	CR931673	CTT AAT AGC TCT CAT TAT TCT TTT TTT AAG CC	wzy	12687	573	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
18C/18F/18B/18A-r		TTA TCT GTA AAC CAT ATC AGC ATC TGA AAC		13230		
19A-f	CR931675	GAG AGA TTC ATA ATC TTG CAC TTA GCC A	wzy	9603	566	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
19A-r		CAT AAT AGC TAC AAA TGA CTC ATC GCC		10142		
19F-f	CR931678	GTT AAG ATT GCT GAT CGA TTA ATT GAT ATC C	wzy	11135	304	Menezes <i>et al.</i> 2013, J. Clin. Microbiol. 51(7):2470-1.
19F-r		GTA ATA TGT CTT TAG GGC GTT TAT GGC GAT AG		11407		
19Fvar-f	KC690152	GAC AAT TCT GGT TGA CTT GTT GAT TTT G	wzy	306	585	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
19Fvar-r		CTA CCA AAT ACC TCA CCA GCT TCC		890		
20-f	CR931679	GAG CAA GAG TTT TTC ACC TGA CAG CGA GAA G	wci L	9567	514	Menezes <i>et al.</i> 2013, J. Clin. Microbiol. 51(7):2470-1.
20-r		CTA AAT TCC TGT AAT TTA GCT AAA ACT CTT ATC		10048		

21-f	CR931680	CTA TGG TTA TTT CAA CTC AAT CGT CAC C	wzx	13247	192	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
21-r		GGC AAA CTC AGA CAT AGT ATA GCA TAG		13412		
22F/22A-f	CR931682	GAG TAT AGC CAG ATT ATG GCA GTT TTA TTG TC	wcw V	11055	643	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
22F/22A-r		CTC CAG CAC TTG CGC TGG AAA CAA CAG ACA AC		11666		
23A-f	CR931683	TAT TCT AGC AAG TGA CGA AGA TGC G	wzy	7739	722	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
23A-r		CCA ACA TGC TTA AAA ACG CTG CTT TAC		8434		
23B-f	CR931684	CCA CAA TTA G CG CTA TAT TCA TTC AAT CG	wzx	13227	199	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
23B-r		GTC CAC GCT GAA TAA AAT GAA GCT CCG		13399		
23F-f	CR931685	GTA ACA GTT GCT GTA GAG GGA ATT GGC TTT TC	wzy	8768	384	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
23F-r		CAC AAC ACC TAA CAC TCG ATG GCT ATA TGA TTC		9119		
24F/24A/24B-f	CR931688	GCT CCC TGC TAT TGT AAT CTT TAA AGA G	wzy	11701	99	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
24F/24A/24B-r		GTG TCT TTT ATT GAC TTT ATC ATA GGT CCG		11770		
31-f	CR931695	GGA AGT TTT CAA GGA TAT GAT AGT GGT GGT GC	wzy	9144	701	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
31-r		CCG AAT AAT ATA TTC AAT ATA TTC CTA CTC		9815		
33F/33A/37-f	CR931702	GAA GGC AAT CAA TGT GAT TGT GTC GCG	wzy	11129	338	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
33F/33A/37-r		CTT CAA AAT GAA GAT TAT AGT ACC CTT CTA C		11436		
34-f	CR931703	GCT TTT GTA AGA GGA GAT TAT TTT CAC CCA AC	wzy	7350	408	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
34-r		CAA TCC GAC TAA GTC TTC AGT AAA AAA CTT TAC		7725		
35A/35C/42-f	CR931704	ATT ACG ACT CCT TAT GTG ACG CGC ATA	wzx	14394	280	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
35A/35C/42-r		CCA ATC CCA AGA TAT ATG CAA CTA GGT T		14646		
35B-f	CR931705	GAT AAG TCT GTT GTG GAG ACT TAA AAA GAA TG	wcr H	10556	677	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
35B-r		CTT TCC AGA TAA TTA CAG GTA TTC CTG AAG CAA G		11199		
35F/47F-f	CR931707	GAA CAT AGT CGC TAT TGT ATT TTA TTT AAA GCA A	wzy	7374	517	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
35F/47F-r		GAC TAG GAG CAT TAT TCC TAG AGC GAG TAA ACC		7858		
38/25F/25A-f	CR931710	CGT TCT TTT ATC TCA CTG TAT AGT ATC TTT ATG	wzy	13848	574	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
38/25F/25A-r		ATG TTT GAA TTA AAG CTA ACG TAA CAA TCC		14392		
39-f	CR931711	TCA TTG TAT TAA CCC TAT GCT TTA TTG GTG	wzy	12289	98	Da Gloria Carvalho <i>et al.</i> 2010. J. Clin. Microbiol. 48: 1611-1618
39-r		GAG TAT CTC CAT TGT ATT GAA ATC TAC CAA		12357		
cps A-f	CR931662	GCA GTA CAG CAG TTT GTT GGA CTG ACC	wzg	1473	160	Pai <i>et al.</i> 2006, J. Clin. Microbiol. 44: 124-131
cps A-r		GAA TAT TTT CAT TAT CAG TCC CAG TC		1607		

* All individual assay used in the multiplex PCR hold equal or better efficiency when used in monoplex fashion

**All serotypes that are co-detected are listed