

Supplemental Table S1. Reports of PCP in renal transplant recipients.

Reference no.	Authors	Year	No. of renal transplant recipients	No. of PCP patients*	Sample types	Detection methods
18	Zhang et al.	2019	1	1	BALF	Wright-Giemsa staining and mNGS
23	Sophie et al.	2019	1	1	BALF	n/a
24	Aghilès et al.	2019	2483	49	BALF and Oral washes	qPCR, Giemsa, TBO and IF
25	Eun et al.	2019	1502	68	Sputum and BALF	PCR and IF
26	Pan et al.	2019	1	1	Sputum	PCR
27	Szydłowiec et al.	2019	72	1	Sputum	nPCR and IF
28	Taylor et al.	2019	1	1	Lung biopsy	GMS and PCR
29	Mascia et al.	2019	1	1	BALF	n/a
30	Prasad et al.	2018	1	1	BALF	GMS
31	Lee et al.	2018	1	1	BALF	Periodic Schiff-Methenamine staining
32	Kono et al.	2018	1	1	Sputum	PCR
33	Nieto-Ríos et al.	2018	2	2	Lung biopsy and BAL	GMS and PCR
34	Ling et al.	2017	4	4	Induced sputum and BALF	PCR
35	Goto et al.	2017	48	48	BALF	Staining and PCR
36	Brakemeier et al.	2016	1368	23	BALF	GMS, IF and PCR

37	Macken et al.	2015	1	1	BALF	PCR and IF
38	Gits-Muselli et al.	2015	14	14	BALF and Induced sputum	qPCR
39	Materkowska et al.	2014	1	1	BALF	PCR
40	Chandola et al.	2014	7	7	Induced sputum	GMS
41	Ramalho et al.	2014	1	1	Lung biopsy and BALF	PCR, TBO, GMS, Ziehl-Neelsen staining and immunohistochemistry
42	Tu et al.	2013	3	3	BALF	GMS
43	Borstnar et al.	2013	601	13	BALF	qPCR and IF
44	Wu et al.	2013	1	1	BALF	GMS
45	Muhammad et al.	2012	1	1	BALF	IF
46	Phipps et al.	2011	14	11	Induced sputum and BAL	GMS and qPCR
47	Castro et al.	2010	750	11	Induced sputum and BALF	Giemsa staining, IF and PCR
48	Camara et al.	2010	1	1	BALF	PCR, IF and May-Grümwald-Giemsa
49	Gianella et al.	2010	20	20	BALF and sputum	PCR, IF and TBO
50	Shelton et al.	2009	2	2	BALF	PCR and TBO
51	Yazaki et al.	2009	33	33	BALF	GMS
52	Arichi et al.	2009	441	10	Respiratory samples	PCR
53	Kumar et al.	2009	1	1	BALF	IF
54	Li et al.	2009	1	1	Lung biopsy	GMS

55	Boothpur et al.	2008	1	1	Lung biopsy and BALF	GMS
56	Aguirre et al.	2007	1	1	BALF	TBO and PCR
57	Boer et al.	2007	26	22	BALF	qPCR and GMS
58	Verma et al.	2006	1	1	Lung biopsy	IF
59	Hung et al.	2006	1	1	Lung biopsy	GMS
60	Totet et al.	2005	1	1	BALF	IF and Giemsa staining
61	Höcker et al.	2005	3	3	BALF	IF and PCR
62	Morosi et al.	2004	1	1	BALF	IF
63	Radisic et al.	2003	240	17	BALF and lung biopsy	GMS and IF
64	Chen et al.	2002	1	1	BALF	GMS
65	Lufft et al.	1996	1192	10	BALF	IF and Diff-Quick staining
66	Hennequin et al.	1995	7	7	BALF	Giemsa and GMS
67	Chave et al.	1991	244	5	BALF	GMS

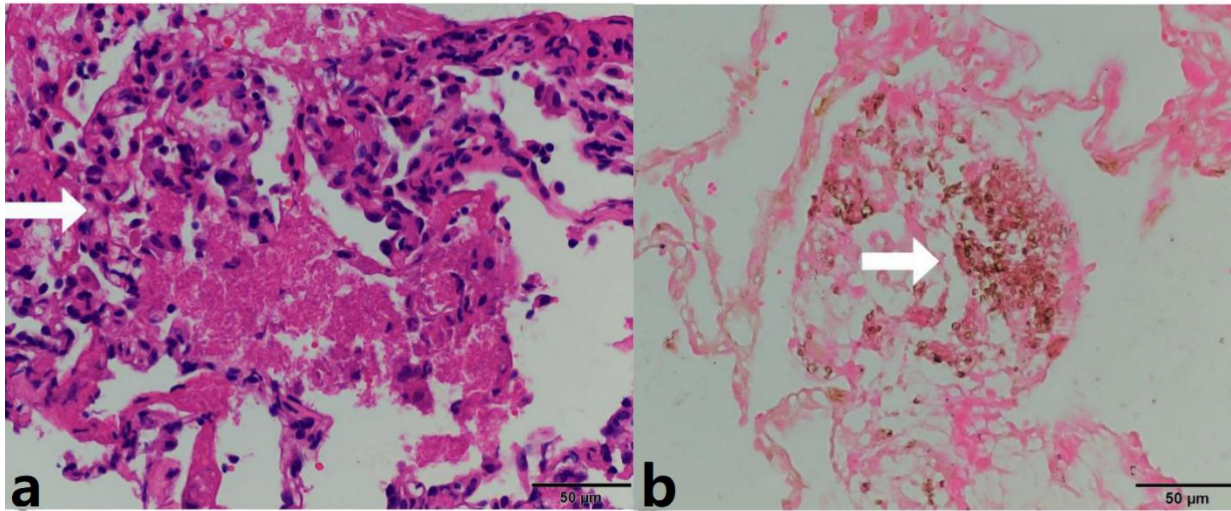
*No. of confirmed PCP patients following renal transplantation.

Abbreviations: PCR, polymerase chain reaction (regular single round); qPCR, quantitative PCR; nPCR, nested PCR; GMS, Grocott's or Gomori's methenamine silver staining; TBO, toluidine blue O staining; IF, direct or indirect immunofluorescence staining; BALF, bronchoalveolar lavage fluid; mNGS, metagenomics next-generation sequencing; n/a, data not available.

Supplemental Table S2. Microorganisms detected by mNGS.

Genus	No. of reads*	Species	No. of reads*
<i>Pneumocystis</i>	1,665,693	<i>Pneumocystis jirovecii</i>	1,665,693
<i>Granulicatella</i>	1,445	<i>Granulicatella elegans</i>	1,406
		<i>Granulicatella adiacens</i>	7
<i>Streptococcus</i>	8,863	<i>Streptococcus mitis</i>	1,079
		<i>Streptococcus pseudopneumoniae</i>	580
<i>Lactococcus</i>	215	<i>Lactococcus lactis</i>	212
<i>Leuconostoc</i>	53	<i>Leuconostoc citreum</i>	40
		<i>Leuconostoc lactis</i>	5
<i>Treponema</i>	38	<i>Treponema denticola</i>	33
<i>Campylobacter</i>	45	<i>Campylobacter rectus</i>	16
		<i>Campylobacter concisus</i>	8
Anellovirus	12	<i>Torque teno virus</i>	12

* One BALF sample was directly sequenced after extracting total genomic DNA (without any depletion or enrichment procedure). NGS sequencing of a single-read SE50 library (50 ng input DNA) yielded a total of 24,165,934 reads (50 bp each). Raw reads were filtered out for ambiguous bases, low-quality (\leq Q20) bases or adapter contamination. Reads for human DNA were removed by aligning to the human reference genome assembly GRCh38.p13 (GenBank accession number GCF_000001405.39). The remaining reads (1,676,364) were searched against an in-house microbial and parasitic genome database of BGI, consisting of 3,446 bacterial species (including 104 mycobacterial species and 45 mycoplasma and chlamydial species), 1,515 viral species, 206 fungal species (including the *P. jirovecii* RU7 genome assembly with GenBank assembly accession: GCA_001477535.1), and 140 parasitic species. Reads for some genera could not be reliably assigned at the species level.



Supplemental Figure S1. Pathological examination of lung biopsy specimens. (a) Hematoxylin-eosin staining of a lung tissue section, showing the presence of abundant foamy or granular eosinophilic exudates as well as a few lymphocytes infiltrates (white arrow) in alveolar spaces. The alveolar septa became thickened due to edema and dilated capillaries. (b) Gomori methenamine-silver staining of a lung tissue section, showing the presence of a plenty of dark brown oval or cup-shaped organisms in alveolar spaces, consistent with the morphology of *P. jirovecii* (white arrow). Scale bar represents 50 μM.