Letters

Cellular Fatty Acids as Chemical Markers for Differentiation of *Acinetobacter baumannii* and *Acinetobacter calcoaceticus*[*]

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Abstract

Objective *Gas chromatography (GC) was used to investigate the cellular fatty acid (CFA) c*omposition of 141 *Acinetobacter baumannii* and 32 *A. calcoaceticus* isolates from different locations in China and to find chemical markers to differentiate these two closely related bacteria.

Methods Whole cell fatty acid methyl esters (FAMEs) were obtained by saponification, methylation, and extraction for GC analysis, followed by a standardized Microbial Identification System (MIS) analysis.

Results All *A. baumannii* and *A. calcoaceticus* strains contained some major fatty acids, namely, 18:1 ω9c, 16:0, Sum In Feature 3, 12:0, 17:1ω8c, 3-OH-12:0, 17:0, Sum In Feature 2, 2-OH-12:0, and 18:0 compounds. Although most of the total CFAs are similar between *A. baumannii* and *A. calcoaceticus* strains, the ratios of two pairs of CFAs, i.e., Sum In Feature 3/18:1 ω9c versus 16:0/18:1 ω9c and Sum In Feature 3/18:1 ω9c versus unknown 12.484/18:1 ω9c fatty acids, could differentiate these two closely related bacteria. *A. baumannii* could be easily classified into two subgroups by plotting some ratios such as Sum In Feature 3/16:0 versus 17:0 and Sum In Feature 3/2-OH-12:0 versus17:0 fatty acids.

Conclusion The ratios of some CFAs could be used as chemical markers to distinguish *A. baumannii* from *A. calcoaceticus.*

Key words: *Acinetobacter baumannii*; *Acinetobacter calcoaceticus*; Differentiation; Fatty acids; Gas chromatography.

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INTRODUCTION

Acinetobacter bacteria are gram-negative, strictly aerobic, non-motile coccobacilli that are commonly distributed in soil and water of natural environments[1]. Some of these bacteria are also important nosocomial pathogens. These bacteria are usually associated with skin colonization of hospitalized patients and have been associated with serious infections. The genus *Acinetobacter* currently contains up to 23 described and named, as well as several unnamed (genomic), species[2]. Three of the most clinically relevant species, *A. baumannii*, genomic species 3, and 13TU, are

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commonly grouped with the environmental organism *A. calcoaceticus* in the *A. calcoaceticus–A. baumannii* complex because of the difficulty in differentiating these species using phenotypic methods[3-4].

In recent decades, *A. baumannii* has increasingly been implicated in outbreaks of nosocomial infections causing pneumonia, bacteremia, urinary tract infections, wound infections, and meningitis worldwide because of its innate and acquired antimicrobial resistance as well tendency for epidemic spread[5-6]. The increasing rates of the resistance of this species to the major antimicrobial agents necessitate early identification and control of nosocomial outbreaks. There are several successful epidemic *A. baumannii* strains (clones) circulating in Europe according to recent data. Thus, a better understanding of the diversity within the species and the emergence of epidemic clones is needed[7-9].

Several methods are used to identify the *Acinetobacter* species, including phenotypic features and genetic markers. DNA-DNA hybridization is the standard method to differentiate these species, but this technique is very laborious, which prevents its routine application in clinical laboratories. The phenotypic identification scheme proposed by Bouvet and Grimont in 1986 was based on 28 phenotypes[10]. However, this scheme could not distinguish the closely related and clinically relevant *A. calcoaceticus-A. baumannii* complex[3]. Many molecular methods have been developed and validated for the identification of acinetobacters, including the amplified 16S rRNA gene restriction analysis (ARDRA)[11], the high-resolution fingerprint analysis by amplified fragment length polymorphism (AFLP)[12-13], ribotyping[4], tRNA spacer fingerprinting[14], and so on. ARDRA and AFLP analyses are currently the most widely accepted methods for species identification of acinetobacters, with a large library of profiles available for both reference and clinical strains. However, these techniques are time-consuming. Recently, new methods have been proposed for the identification of *Acinetobacter* isolates to the species level mainly based on polymerase chain reaction (PCR) and sequencing technologies. These techniques include sequencing of the *rpoB* gene and its flanking spacer regions[15] (as well as the 16S-23S rRNA gene spacer region[16]), PCR-based method that exploits differences in *gyrB* gene sequences[17], detection of the intrinsic *bla*OXA-51-like carbapenemase gene[18], and genotyping by multilocus PCR as well as mass spectrometry[19]. These methods, based on their detection of nucleic acid, have contributed to a better understanding of the epidemiology and clinical significance of *Acinetobacter* species in recent years. However, new methods should be developed to provide alternative choices for professionals.

Aside from the methods described above, the determination of cellular fatty acid (CFA) composition by gas chromatography (GC) may serve as an alternative method to distinguish the *Acinetobacter* species. As early as 1963, Abel et al.[20]and Kaneda presented evidence that suggested the probable successful use of CFA for bacterial identification[21-22]. Other early studies facilitated the establishment of CFA analysis as a widely accepted method for bacterial identification and classification[23]. The normalization of the bacterial fatty acid analysis method with GC is required for parallel comparison of CFA results from different laboratories. The improvement of the Sherlock Microbial Identification System (MIS) and Sherlock standard libraries (MIDI Corporation) has made realization of this goal possible. The purpose of the present study is to analyze the fatty acid composition of different strains of *A. baumannii* and *A. calcoaceticus* using the Sherlock MIS and to determine the differentiation capability of fatty acid patterns.

MATERIALS AND METHODS

Bacterial Strains and Culture Condition

Bacterial Strains A total of 141 strains of *A. baumannii* and 32 strains of *A. calcoaceticus* were collected from eight provinces in China. All these strains, isolated between 2008 and 2009 from 10 different hospitals in different cities in China, were identified by conventional biochemical features and confirmed at the species level by ARDRA[11]. The sources of the strains are provided in the supplementary Table S1.

Growth Conditions Fatty acids were extracted and analyzed by following the Sherlock MIS protocol (MIS, MIDI Inc., Newark, DE)[24]. The growth medium was trypticase soy broth agar (BD, USA). The cultures were incubated for 24 h at 28 °C to allow the population to reach the stationary growth phase where the fatty acid composition is rather stable.

Chemical Procedures and GC

CFAs were extracted and transformed into fatty acid methyl esters (FAMEs) by using the method recommended by the Sherlock MIS protocol. The

following procedures were performed: (i) saponification at 100 °C for 30 min after adding 1 mL of 15% (w/v) NaOH in 50% methanol; (ii) methylation of the released fatty acids at 80 °C with 2 mL of methanolic HCl (325 mL 6 N HCl mixed with 275 mL methanol) for 10 min; (iii) extraction of the FAMEs into 1.25 mL of 1:1 (v/v) ether and hexane; and (iv) washing of the organic extract with 3 mL of 1.2% (w/v) NaOH.

FAMEs were analyzed by GC by following the MIS operation manual[24]. The gas chromatographic unit consists of a Hewlett-Packard 6890 module (Version A.03.02) equipped with a 25 m × 0.2 mm cross-linked 5% phenylmethyl silicone fused-silica capillary column (Ultra-2, HP 19091B-102, Hewlett-Packard Co.), a flame ionization detector, and a 7673 automatic sampler (Hewlett-Packard Co.). The column temperature ramps from 170 °C to 260 °C at the speed of 5 °C per min, then increases to 310 °C at the speed of 40 °C per min, and finally is kept at 310 °C for 1 min. Hydrogen serves as the carrier gas at the addition speed of 0.5 mL per min. The FAMEs were identified and qualified by the Sherlock MIS software (ver. 4.5) according to their equivalent chain value.

Statistical Analysis

The relative quantitative data of CFA profiles obtained by the Sherlock MIS are provided in supplementary Table S1. The means of the CFA contents of different bacteria from different locations were analyzed by ANOVA of SAS system (Version 8.2, SAS Institute Inc., Cary, NC, USA). Statistical significance was accepted when $P<0.05$.

RESULTS

Fatty Acid Composition of A. baumannii

The average CFA percentage of *A. baumannii* strains obtained from different locations is presented in Figure 1a. All strains possess CFAs with almost identical characteristics. The most significant CFA is 18:1 ω9c, with an average proportion of approximately 42%. The other two major CFAs are 16:0 (19.2%) and Sum In Feature 3 (comprising iso-2-OH-15:0 and/or 16:1 ω 7c; 13.6%). These three CFAs account for approximately 70% of the total CFAs, similar to those reported previously[25-27]. The proportions of 12:0, 17:1ω 8c, 3-OH-12:0, 17:0, Sum In Feature 2 (comprising 16:1 ISO I and/or 3-OH-14:0), 2-OH-12:0, and 18:0 are relatively lower. In the present study, the minor fatty acids detected in the different strains of *A. baumannii* are 10:0, unknown 12.484, 13:0, Sum In Feature 1 (comprising 15:1 ISO H and/or 3-OH-13:0), 15:1 ANTEISO A, ISO 3-OH-12:0, 15:1 ISO F, and 16:1 ω9c, with the average contents of less than 1%.

Fatty acid Composition of A. calcoaceticus

The CFA profiles of *A. calcoaceticus* isolates are shown in Figure 1b. The proportion of 18:1 ω9c fatty acid (more than 28%) is the highest among the CFAs in this bacterium. The Sum In Feature 3 and 16:0 are the second and the third most abundant, with an average proportion of 24% and 20%, respectively. Other components such as 12:0, 17:1ω 8c, 3-OH-12:0, 18:1 ω7c, 15:0, Sum In Feature 2, 18:0, and so on, are similar to those in *A. baumannii* strains.

Comparison of CFAs between A. baumannii and A. calcoaceticus

The differences in fatty acids among *A. baumannii* and *A. calcoaceticus* strains were assessed by ANOVA. *P* values were both less than 0.01 in 18:1 ω9c and Sum In Feature 3 fatty acids. The *P* values in 18:1 ω7c, 18:0, 17:0, and 14:0 were less than 0.05 between the two different species (Figure 2).

A. baumannii Subgrouping by Fatty Acid Markers

Using the standardized procedure for analyzing fatty acids, *A. baumannii* could be easily classified into two subgroups by plotting some ratios such as Sum In Feature 3/16:0 versus 17:0 and Sum In Feature 3/2-OH-12:0 versus17:0 fatty acids (Figure 3).

Chemical Markers for Differentiating A. baumannii and A. calcoaceticus

By plotting the ratios of the Sum In Feature 3/18:1 ω9c versus 16:0/18:1 ω9c and unknown 12.484/18:1 ω9c versus Sum In Feature 3/18:1 ω9c fatty acids (Figure 4), two clusters were clearly observed for each of the two species.

DISCUSSION

The reproducibility of the CFA analysis by MIS was confirmed previously in the authors' laboratory, indicating that the major CFA compositions (those above 1% of the total fatty acids) of the samples are stable and that the variance coefficients of different fatty acids vary from 0.52% to 6.69%[28].

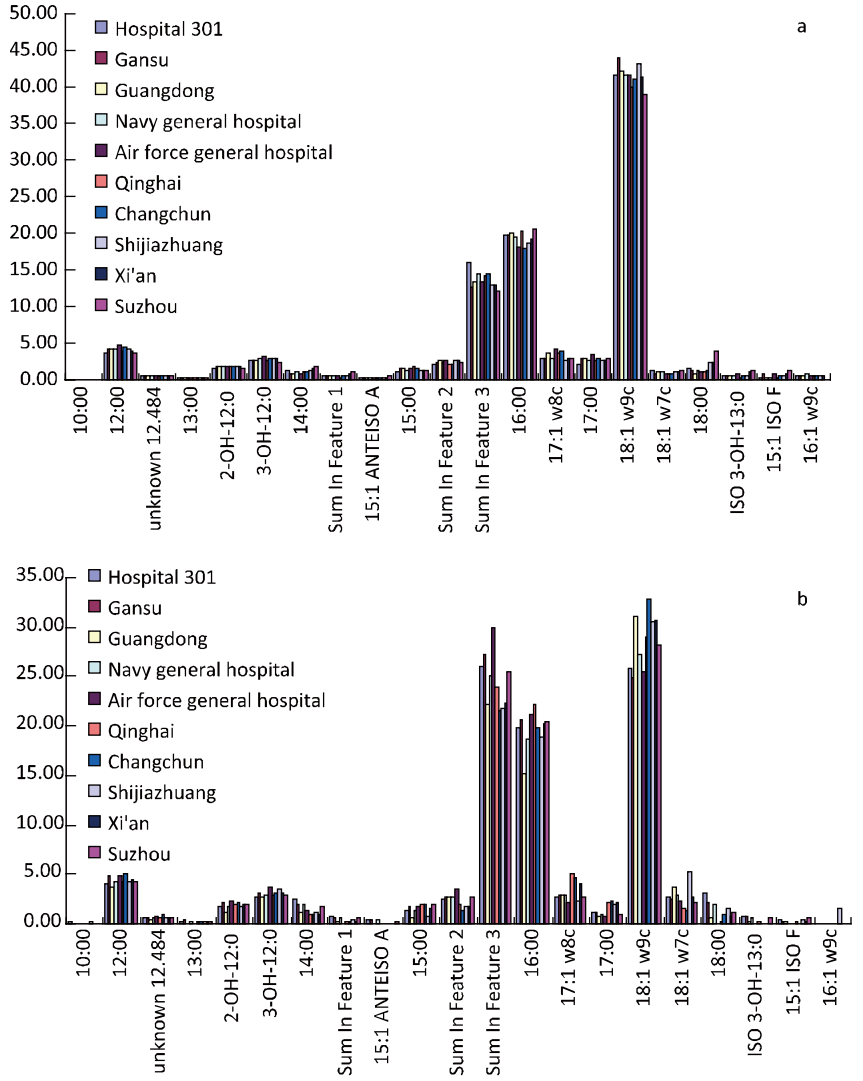

Figure 1. a, Histogram based on the CFAs of all *A. baumannii* strains. b, Histogram based on the CFAs of all *A. calcoaceticus* strains.

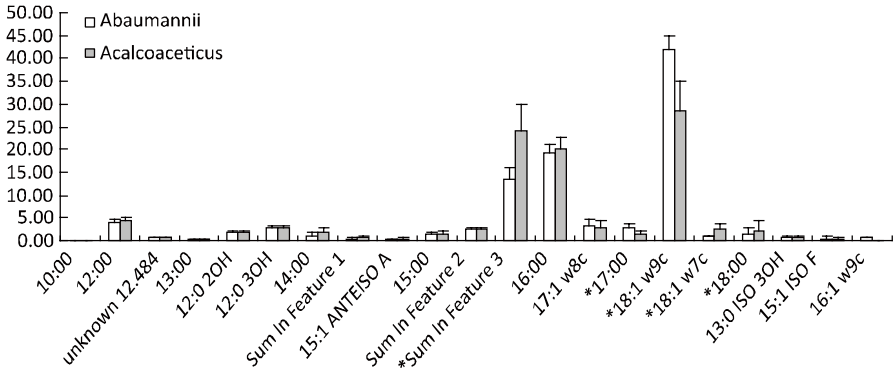

Figure 2. Histogram based on the CFAs of all strains studied. Fatty acids marked with "*" stand for the significant difference between the two species.

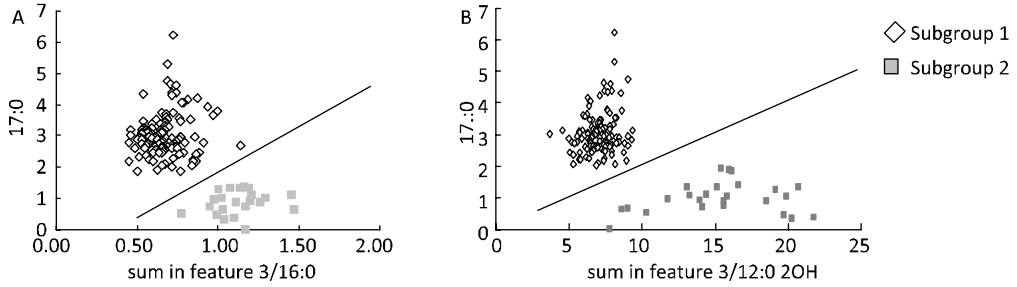

Figure 3. *A. baumannii* subgrouping by plotting the ratios of Sum In Feature 3/16:0 versus 17:0 (A) and Sum In Feature 3/2-OH-12:0 versus17:0 (B).

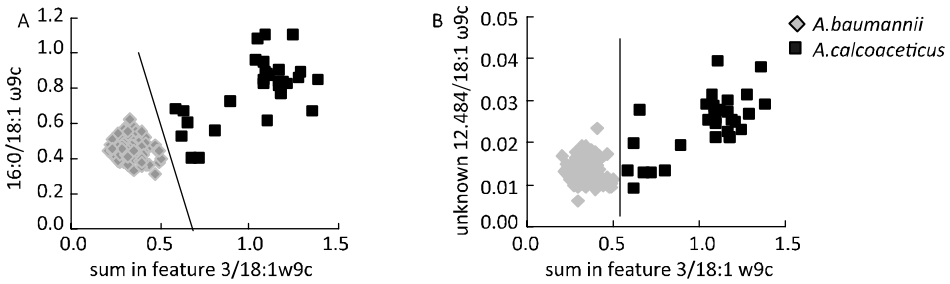

Figure 4. Differentiation of *A. baumannii* from *A. calcoaceticus* by plotting the ratios of Sum In Feature 3/18:1 ω9c versus 16:0/18:1 ω9c (A) and unknown 12.484/18:1 ω9c versus Sum In Feature 3/18:1 ω9c fatty acids (B).

Comparison of CFAs of A. baumannii and A. calcoaceticus strains from Different Locations

The differences in fatty acids among the strains from different locations were assessed by ANOVA. The results demonstrate that the *P* values were greater than 0.05 in all fatty acids, indicating a significant similarity in CFA profiles of different strains from different locations. In general, the fatty acid compositions of *A. baumannii* (Figure 1a) or *A. calcoaceticus* (Figure 1b) strains are very conservative such that discriminating their sources by CFA profiles is impossible.

Comparison of CFAs between A. baumannii and A. calcoaceticus

From Figure 2, 18:1 ω9c and Sum In Feature 3 fatty acids represent a significant distinction between *A. baumannii and A. calcoaceticus*. Aside from these two acids, there are other fatty acids whose contents have distinct differences between the two species, such as 18:1 ω7c, 18:0, 17:0, 14:0, and so on. However, the contents of five fatty acids (12:0, 15:0, 3-OH-12:0, 2-OH-12:0, and Sum In Feature 2) were found to be highly similar. Notably, approximately half of the *A. baumannii* strains possessed 16:1 ω9c fatty acids in small amount, but was absent in all of the *A. calcoaceticus* strains. Although there were several fatty acids that show some distinctions, the whole fatty acid profiles of *A. baumannii* and *A. calcoaceticus* are too similar to be discriminated by some specific CFA compositions[27].

A. baumannii Subgrouping by Fatty Acid Markers

Two clusters were clearly observed by plotting the ratios Sum In Feature 3/16:0 versus 17:0 and Sum In Feature 3/2-OH-12:0 versus 17:0 fatty acids, indicating that these ratios could serve as chemical markers to differentiate the two *Acinetobacter* strains. Although the characteristics and significance of each cluster are not understood, the distinct classification in *A. baumannii* strains could be further investigated. This phenomenon is presumed to be related to some phenotype, such as drug resistance. However, the characteristics of the samples used in the present research are not complete. Thus, no conclusion can be drawn at present.

Chemical Markers for Differentiating A. baumannii and A. calcoaceticus

A previous report has revealed that *Yersinia*

pestis and two other human-pathogenic *Yersinia* (*Y. pseudotuberculosis* and *Y. enterocolitica*) could be separated by plotting the ratios of the 12:0/16:0 and 14:0/16:0 fatty acids[29]. There are only a few previous studies on the CFAs of *Acinetobacter* strains. In the present study, the Sherlock MIS was used to analyze the fatty acid compositions of the different strains of *A. baumannii* and *A. calcoaceticus* to determine stable chemical markers to differentiate them. Results show that *A. baumannii* could be easily differentiated from *A. calcoaceticus* by plotting the ratios of the Sum In Feature 3/18:1 ω9c versus 16:0/18:1 ω9c and unknown 12.484/18:1 ω9c versus Sum In Feature 3/18:1 ω9c fatty acids. Two clusters were clearly observed for each of the two species, indicating that these CFA ratios could serve as a potential method to differentiate *A. baumannii* from *A. calcoaceticus*.

In conclusion, there is no significant difference in the CFA profiles between *A. baumannii* and *A. calcoaceticus* strains isolated from different locations in China. *A. baumannii* can be easily classified into two subgroups by plotting some ratios of CFAs. Although the CFA contents are similar in *A. baumannii* and *A. calcoaceticus*, two chemical markers were obtained to discriminate these species.

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original ID	isolate	country	location	year	**species**	**source**	10:00	12:00	unknown 12.484	13:00	12:0 2OH	12:0 3OH	14:00	Sum In Feature 1	15:1 ANTEISO A	15:00	Sum In Feature 2	Sum In Feature 3	16:00	17:1 w8c	17:00	18:1 w9c	18:1 w7c	18:00	13:0 ISO 3OH	15:1 ISO F	16:1 w9c
1	Air force general hospital 3136	China	Beijing	2008	*A. baumannii*	sputum		4.9	0.72	0.28	1.99	3.52	0.48	0.4		1.81	2.53	13.61	17.67	3.69	4.36	42.7	0.61	0.71			
2	Air force general hospital 3137	China	Beijing	2008	*A. baumannii*	sputum	0.09	4.1	0.6	0.23	1.86	2.91	0.53	0.28		1.34	2.8	11.53	19.22	3.08	2.91	46.63	0.66	0.65			0.49
3	Air force general hospital 3138	China	Beijing	2008	*A. baumannii*	sputum	0.06	4.3	0.48	0.24	1.92	2.96	1.57	0.76	0.34	1.61	2.75	12.59	19.21	2.47	2.73	41.7	0.9	1.13	0.96	0.84	
4	Air force general hospital 3139	China	Beijing	2008	*A. baumannii*	sputum	0.06	3.7	0.52	0.18	1.69	2.55	1.56	0.67	0.29	1.31	2.36	10.6	19.86	2.96	2.96	41.22	1.15	3.99	0.81	0.71	0.46
5	Air force general hospital 3140	China	Beijing	2008	*A. baumannii*	sputum	0.08	5.2	0.79	0.37	2.23	3.63	0.52	0.52		1.94	3.25	14.2	16.31	4.57	3.66	41.1	0.85	0.64			
6	Air force general hospital 3147	China	Beijing	2008	*A. baumannii*	sputum	0.09	5.4	0.49	0.44	1.93	3.56	0.45	0.58		2.06	2.09	15.24	17.97	7.41	4.23	36.41	0.88	0.36			
7	Air force general hospital 3148	China	Beijing	2008	*A. baumannii*	sputum	0.1	5.4	0.52	0.41	1.99	3.68	0.42	0.58		1.9	2.21	14.81	17.51	6.98	4.17	37.58	0.86	0.39			
8	Air force general hospital 3150	China	Beijing	2008	*A. baumannii*	sputum	0.07	4.4	0.6	0.23	1.85	2.86	0.45	0.29		1.44	2.6	13.81	18.13	2.99	3.26	44.95	0.62	1.09			
9	Changchun R151	China	Jilin	2009	*A. baumannii*	sputum	0.1	5.9	0.6	0.26	2.12	3.63	1.31	0.67	0.19	1.19	2.32	16.18	17.17	4.37	2.05	38.08	0.93	1.32	0.55		0.61
10	Changchun R180	China	Jilin	2009	*A. baumannii*	blood	0.07	4.1	0.51	0.2	1.76	2.71	1.73	0.81	0.36	1.51	2.63	11.46	21.75	3.42	2.34	42.04	1.07	0.82			0.47
11	Changchun R221	China	Jilin	2009	*A. baumannii*	sputum		3.8	0.51	0.19	1.6	2.73	1.4	0.55	0.22	1.5	2.68	12.05	20.25	2.64	3.03	43.74	0.82	1.32			0.45
12	Changchun R222	China	Jilin	2009	*A. baumannii*	sputum		3.9	0.39	0.3	1.55	2.48	1.57	0.87	0.32	1.67	1.71	12.09	18.58	4.43	4.77	40.92	0.96	3.18			
13	Changchun R247	China	Jilin	2009	*A. baumannii*	sputum	0.06	4.3	0.75	0.24	1.99	2.91	0.59	0.18		1.86	1.88	15.23	20.96	3.12	2.62	40.93	0.65	0.72			0.53
14	Changchun R279	China	Jilin	2009	*A. baumannii*	sputum	0.06	3.4	0.46	0.11	1.18	2.45	1.26	0.5	0.2	0.9	2.37	17.03	17.34	2.2	1.39	44.61	1.02	1.22	0.56	0.48	0.75
15	Changchun R321	China	Jilin	2009	*A. baumannii*	sputum	0.07	4.4	0.74	0.32	2.01	3	1.1	0.41		1.69	2.6	12.31	18.15	4.57	3.54	41.28	0.94	2.25	0.34		
16	Changchun R354	China	Jilin	2009	*A. baumannii*	sputum	0.07	3.5	0.49	0.06	1.09	2.52	1.27	0.48	0.23	0.29	2.44	16.49	16.06	1.82	0.74	47.66	1.15	1.43	0.63	0.54	0.67
17	Changchun R384	China	Jilin	2009	*A. baumannii*	sputum	0.1	6.6	0.61	0.44	2.78	3.89	1.13	0.46	0.09	2.01	2.37	16.66	17.12	4.65	2.42	35.54	0.68	0.62	0.23	0.2	0.58
18	Changchun R386	China	Jilin	2009	*A. baumannii*	sputum	0.09	5.2	0.68	0.33	2.17	3.38	0.9	0.49		1.63	2.6	13.84	17.85	4.01	2.75	40.81	0.85	0.94	0.2	0.14	0.46
19	Changchun R718	China	Jilin	2009	*A. baumannii*	sputum		3.6	0.56	0.2	1.54	2.5		0.65	0.31	1.68	2.58	12.54	19.82	2.79	3.27	43.7	0.9	1.38	1	0.67	
20	Changchun R722	China	Jilin	2009	*A. baumannii*	sputum	0.1	4.5	0.69	0.26	1.98	3.03	1.15	0.43		1.32	2.72	12.31	18.09	3.54	2.99	42.95	0.93	2.1	0.28		
21	Changchun R772	China	Jilin	2009	*A. baumannii*	sputum	0.13	4.9	0.68	0.27	2.19	3.13	1.86	0.92	0.36	1.4	3.18	11.78	17.2	3.73	3.46	41.55	0.96	1.28			
22	Changchun R786	China	Jilin	2009	*A. baumannii*	sputum	0.07	4.7	0.49	0.25	1.78	2.91	1.02	0.41		1.22	1.6	13.87	19.92	4.31	3.22	40.48	1.01	1.82	0.32	0.21	
23	Changchun R853	China	Jilin	2009	*A. baumannii*	sputum	0.08	4.2	0.67	0.31	1.94	3.09	1.46	0.89	0.29	2.22	2.6	17.01	14.85	3.01	3.92	39.94	0.85	1.21			
24	Changchun R859	China	Jilin	2009	*A. baumannii*	sputum	0.11	3.7	0.51		1.41	3.24	1.36	0.6	0.26	0.55	2	21.67	18.57	2.62	1.02	39.37	1.02	1.16			0.65
25	Changchun R868	China	Jilin	2009	*A. baumannii*	sputum	0.13	5.1	0.55	0.18	1.95	3.62	0.75			2.06	2.36	16.15	17.73	3.97	3.74	40.03	0.75	0.71			
26	Changchun RBd	China	Jilin	2009	*A. baumannii*	sputum	0.07	3.8	0.53	0.18	1.47	2.43	0.46	0.22		1.64	0.1	13.63	20.58	2.92	3.23	44.36	0.71	1.12			
27	Changchun W131	China	Jilin	2009	*A. baumannii*	sputum		3	0.6	0.26	1.13	2.07	2.38	1.29	0.51	1.25	1.96	9.53	16.85	5.54	5.29	33.6	2.26	7.83	1.5	1.29	0.55
28	Changchun W193	China	Jilin	2009	*A. baumannii*	sputum	0.08	4.9	0.73	0.29	2.11	3.17	0.46	0.39		1.5	0.09	12.43	16.77	3.71	3.46	44.64	0.72	0.71			0.47

39	Changchun W201	China	Jilin	2009	*A. baumannii*	Bronchial aspirate	0.1	5	0.69	0.33	2.12	3.24	0.62	0.39		1.63	2.85	13.78	17.42	4.04	3.06	42.74	0.72	0.49			0.47
30	Changchun W202	China	Jilin	2009	*A. baumannii*	sputum	0.1	5.8	0.68	0.35	2.47	3.64	0.93	0.33		1.84	2.29	15.54	17.69	4.29	2.46	38.77	0.88	0.55	0.25	0.25	0.55
31	Changchun W202	China	Jilin	2009	*A. baumannii*	sputum	0.09	5.2	0.58	0.31	2.24	3.36	0.96	0.45	0.11	1.69	2.23	14.34	17.56	4	2.71	40.99	0.73	0.8	0.32	0.27	0.54
32	Changchun W204	China	Jilin	2009	*A. baumannii*	sputum	0.07	4	0.5	0.52	1.63	2.73	0.74	0.75		1.65	2	14	14	10.88	6.24	36.26	0.61	0.69	0.17	0.2	0.63
33	Changchun W237	China	Jilin	2009	*A. baumannii*	sputum		4.7	0.63	0.3	1.95	3.07	1.06	0.39		1.65	2.74	13.3	17.6	4.27	3.46	43.03	0.81	0.82			
34	Gansu 13111	China	Gansu	2009	*A. baumannii*	sputum	0.07	4.7	0.61	0.24	1.98	3.15	0.67	0.3		1.47	2.94	10.49	20.65	2.37	2.82	45.75	0.61	1.05			
35	Gansu 13118	China	Gansu	2009	*A. baumannii*	sputum	0.09	4.9	0.76	0.26	2.13	3.14	0.47	0.39		1.51	2.93	13.77	17.26	4	3.45	42.99	0.76	0.69			
36	Gansu 14281	China	Gansu	2009	*A. baumannii*	sputum	----	3.5	0.57	0.23	1.68	2.37		0.94	0.44	1.45	2.24	11.95	20.2	2.69	2.98	41.79	1.25	3.52	1.15	1.05	
37	Gansu 14715	China	Gansu	2009	*A. baumannii*	sputum		4	0.53	0.22	1.76	2.76	0.49	0.25		1.25	2.64	12.94	19.66	2.7	2.92	46.39	0.65	0.77			
38	Gansu 15216	China	Gansu	2009	*A. baumannii*	sputum	0.06	3.7	0.52	0.22	1.67	2.53	1.02	0.44	0.13	1.41	2.37	12.33	20.59	3.03	2.95	43.01	1.13	1.89	0.36		0.44
39	Gansu 15478	China	Gansu	2009	*A. baumannii*	sputum	0.08	4.1	0.52	0.28	1.89	2.83	0.81	0.35		1.86	2.73	13.53	19.82	3.49	3.18	42.28	0.7	0.71	0.12		0.54
40	Gansu 15490	China	Gansu	2009	*A. baumannii*	sputum	0.08	5	0.67	0.21	1.76	3.06	0.42	0.28		1.25	0.14	12.5	19.43	2.65	2.7	44.71	0.65	0.72			0.52
41	Gansu 15546	China	Gansu	2009	*A. baumannii*	secretion from burning patient		3.9	0.55	0.18	1.75	2.68		0.81	0.37	1.24	2.53	12.08	19.65	2.54	2.67	44.26	0.85	1.18	1.09	0.96	0.5
42	Gansu 15567	China	Gansu	2009	*A. baumannii*	sputum	0.05	3.5	0.45	0.24	1.68	2.36	0.79	0.26		1.66	2.24	13.52	20.05	3.22	3.18	44.24	0.76	0.88	0.18	0.15	0.45
43	Gansu 15568	China	Gansu	2009	*A. baumannii*	sputum	0.06	4	0.54	0.22	1.78	2.73	0.5	0.26		1.48	2.47	12.47	20.19	3.06	3.14	44.89	0.66	0.93			0.45
44	Gansu S722	China	Gansu	2009	*A. baumannii*	secretion from burning patient	0.07	3.7	0.52	0.2	1.65	2.63	1.27	0.6	0.24	1.66	2.44	12.36	20.1	2.8	2.79	43.82	0.77	0.9	0.7		0.46
45	Guangzhou 1002	China	Guangdong	2009	*A. baumannii*	sputum	0.08	4.1	0.5	0.29	1.73	2.64	0.55	0.35		2.02	2.69	14.57	19.05	4.97	3.3	41.51	0.81	0.53			
46	Guangzhou 1003	China	Guangdong	2009	*A. baumannii*	sputum	0.06	4.2	0.6	0.27	1.73	2.53	1.43	0.66	0.21	1.95	2.58	13.54	19.54	4.78	3.11	40.46	1.08	0.98			
47	Guangzhou 1009	China	Guangdong	2009	*A. baumannii*	sputum	0.07	3.8	0.6	0.26	1.68	2.56	0.56	0.3		1.66	2.45	12.94	20.65	3.42	3.35	43.95	0.73	0.81			
48	Guangzhou 1070	China	Guangdong	2009	*A. baumannii*	sputum	0.09	5	0.66	0.16	2.15	3.4	0.6	0.35		0.79	3.13	10.69	21.32	2.03	2.26	44.96	0.6	1.12			0.71
49	Guangzhou 1083	China	Guangdong	2009	*A. baumannii*	sputum	0.08	4.2	0.48	0.23	1.68	2.78	0.62	0.32		1.6	2.66	13.83	19.33	4.53	2.71	42.97	0.83	0.8			
50	Guangzhou 1203	China	Guangdong	2009	*A. baumannii*	sputum	0.07	3.3	0.4	0.47	1.39	2.1	2.81	0.52	0.19	2.77	2.26	9.85	19.07	3.47	4.31	33.47			0.53	0.44	
51	Guangzhou 1207	China	Guangdong	2009	*A. baumannii*	sputum	0.05	4	0.59	0.18	1.89	2.88		0.55	0.2	1.31	2.78	12.42	20.9	2.25	2.65	43.2	0.91	1.74	0.57	0.45	
52	Guangzhou 1213	China	Guangdong	2009	*A. baumannii*	urine	0.06	4.1	0.58	0.35	1.79	2.71	0.58	0.37		2.2	2.76	10.1	22.46	2.99	3.13	44.09	0.68	0.54			0.45
53	Guangzhou 1253	China	Guangdong	2009	*A. baumannii*	sputum	0.11	4.6	0.62	0.23	1.77	3.02	0.63	0.34		1.6	2.66	13.51	18.4	3.92	2.87	44.31	0.81	0.42			
54	Guangzhou 1255	China	Guangdong	2009	*A. baumannii*	sputum		4.3	0.53	0.26	1.71	2.84	0.6	0.34		1.87	2.75	13.57	18.87	4.65	2.93	43.35	0.77	0.45			
55	Guangzhou 1311	China	Guangdong	2009	*A. baumannii*	sputum		4.2	0.61	0.34	1.75	2.89	0.46	0.61		1.99	2.41	15.24	21.11	5.17	3.28	38.26	0.6	0.53			
56	Guangzhou 1335	China	Guangdong	2009	*A. baumannii*	sputum	0.09	3.7	0.57	0.21	1.72	2.51	1.37	0.69		1.46	2.46	12.61	21.06	2.96	2.87	43.04	0.98	1.44			
57	Guangzhou 1377	China	Guangdong	2009	*A. baumannii*	sputum	0.05	3.7	0.48	0.19	1.67	2.37	0.69	0.2		1.59	2.14	15.05	22.9	4.04	2.07	41.33	1.01	0.38			
58	Guangzhou 402	China	Guangdong	2009	*A. baumannii*	sputum	0.09	4.4	0.58	0.29	2.05	3.08	0.55	0.33		1.66	2.95	10.33	20.15	2.62	3.18	45.68	0.66	0.81			0.5

59	Hospital 301 2324	China	Beijing	2008	*A. baumannii*	sputum	0.05	4.1	0.5	0.2	1.82	2.73	1.06	0.39	0.12	1.31	2.5	12.43	20.9	2.21	2.37	43.39	0.84	2.03	0.34		0.43
60	Hospital 301 2330	China	Beijing	2008	*A. baumannii*	sputum		4.3	0.65	0.24	1.79	3.02	0.43	0.35		1.35	2.87	11.9	18.24	3.17	3.19	46.22	0.66	0.7			0.56
61	Hospital 301 2333	China	Beijing	2008	*A. baumannii*	sputum		4	0.64	0.3	1.67	2.79	0.41	0.58		0.91	2.49	14.92	17.66	7.62	3.75	40.62	0.7	0.83			
62	Hospital 301 2334	China	Beijing	2008	*A. baumannii*	sputum	0.08	3.1	0.42	0.08	1.57	2.6	1.59	0.55	0.24	1.69	2.12	14.24	23.15	2.95	2.49	40.43	0.81	0.96	0.66		
63	Hospital 301 2339	China	Beijing	2008	*A. baumannii*	sputum		4.5	0.65	0.18	1.99	2.98	0.59	0.27		1.31	2.67	13.39	20.07	2.29	2.62	44.62	0.68	1.18			
64	Hospital 301 2340	China	Beijing	2008	*A. baumannii*	sputum	0.09	3.9	0.53	0.23	1.78	2.75	0.45	0.24		1.5	2.62	12.82	20.21	2.46	2.81	45.98	0.66	0.89			
65	Hospital 301 2345	China	Beijing	2008	*A. baumannii*	sputum	0.05	3.2	0.42	0.08	1.16	2.39	1.13	0.4	0.19	0.7	0.04	18.51	16.24	2.35	1.08	44.82	1.58	0.94	0.49		0.84
66	Hospital 301 2348	China	Beijing	2008	*A. baumannii*	sputum	0.11	3.5	0.93	0.12	1.02	2.85	1.96	0.72	0.35	0.62	2.33	16.14	16.89	2.72	1.12	39.8	1.54	3.87	0.98		0.67
67	Hospital 301 2349	China	Beijing	2008	*A. baumannii*	sputum	0.06	3.4	0.42		0.98	2.64	0.96	0.22		0.14	2.42	18.15	18.16	0.83	0.32	45.68	1.57			0.2	0.67
68	Hospital 301 2353	China	Beijing	2008	*A. baumannii*	sputum	0.07	3.8	0.5	0.22	1.72	2.49	1.02	0.37		1.49	2.53	13.57	22.22	3.58	2.01	42.06	0.94	0.78	0.29		
69	Hospital 301 2354	China	Beijing	2008	*A. baumannii*	sputum	0.07	3.4	0.47		1.07	2.59	1.42	0.51	0.26	0.38	2.35	21.27	16.86	2.5	0.87	42.41	1.43	1.42			
70	Hospital 301 2355	China	Beijing	2008	*A. baumannii*	sputum		5.3	0.76		2.43	3.66				1.55	3.55	12.88	22.24	3.71	3.15	39.99		0.75			
71	Navy general hospital 3519	China	Beijing	2009	*A. baumannii*	sputum	0.11	5.1	0.71	0.24	2.2	3.54	0.61	0.37		1.39	3.39	12.22	19.23	2.64	2.54	43.76	0.78	0.64			0.55
72	Navy general hospital 0756	China	Beijing	2009	*A. baumannii*	sputum	0.08	4.1	0.56	0.2	1.78	2.74	0.84	0.24		1.49	2.6	14.23	20.67	2.64	2.58	42.58	1.04	1.3	0.07	0.08	
73	Navy general hospital 0757	China	Beijing	2009	*A. baumannii*	sputum	0.08	4.9	0.5	0.44	1.81	3.25	1.19	0.94	0.23	2.17	1.93	14.3	18.11	7.22	4.37	34.81	0.93	0.55	0.68	0.58	0.47
74	Navy general hospital 0769	China	Beijing	2009	*A. baumannii*	sputum	0.06	4.1	0.56	0.22	1.84	2.85	1.34	0.65	0.27	1.33	2.81	12.81	19.95	2.33	2.55	44.07	0.76	1.06			
75	Navy general hospital 1302	China	Beijing	2009	*A. baumannii*	sputum		3.8	0.52	0.23	1.77	2.59	1.43	0.59	0.26	1.6	2.7	13.8	19.32	2.72	2.73	42.51	0.98	1.04	0.71	0.59	
76	Navy general hospital 1637	China	Beijing	2009	*A. baumannii*	sputum	0.05	4.5	0.62	0.3	2.02	3.17	0.82	0.33		1.58	2.78	14.27	21.22	3.08	2.5	40.45	0.64	0.8	0.14	0.1	0.53
77	Navy general hospital 2818	China	Beijing	2009	*A. baumannii*	sputum		3.6	0.45		0.99	2.81	0.65	0.14		0.24	2.38	20.48	16.95	1.65	0.66	46.25	1.05	0.81			0.89
78	Navy general hospital 3483	China	Beijing	2009	*A. baumannii*	sputum	0.07	3.4	0.4	0.05	1.09	2.49	0.95	0.26	0.13	0.38	0.03	20.88	16.04	1.62	0.68	42.47	1.91	0.97	0.29	0.21	0.87
79	Navy general hospital 3500	China	Beijing	2009	*A. baumannii*	sputum	0.06	4	0.5	0.13	1.73	2.66	1.35	0.59	0.2	1.06	2.58	12.78	24.1	2.84	2.2	38.52	1.21	2.64	0.59		
80	Navy general hospital 3521	China	Beijing	2009	*A. baumannii*	sputum	0.07	3.9	0.48	0.22	1.73	2.65	1.23	0.6	0.22	1.48	2.58	14.09	18.57	3.15	2.96	41.74	0.94	1.92	0.6	0.52	
81	Navy general hospital 3655	China	Beijing	2009	*A. baumannii*	sputum	0.08	3.7	0.51	0.26	1.79	2.68	1.3	0.36		1.67	2.64	12.84	20.82	3.43	3.03	41.14	1.19	1.8	0.36		
82	Navy general hospital 3763	China	Beijing	2009	*A. baumannii*	sputum	0.12	4.4	0.65	0.23	1.88	3.29	0.41	0.39		1.92	2.39	13.15	18.36	3.43	4.66	43.41	0.52	0.68			
83	Navy general hospital 3959	China	Beijing	2009	*A. baumannii*	sputum	0.1	5.9	0.43	0.31	2.1	3.47	0.99	0.45	0.08	1.92	2.33	14.93	19.35	3.79	3.09	37.71	0.53	0.87	0.2		0.57
84	Navy general hospital 4230	China	Beijing	2009	*A. baumannii*	sputum		3.6	0.47	0.25	1.7	2.47	2.02	0.93	0.49	1.56	2.33	11.26	20.95	2.87	2.67	38.85	1.22	5.22	1.13		
85	Navy general hospital 4404	China	Beijing	2009	*A. baumannii*	sputum	0.06	4.2	0.56	0.31	1.91	2.8	0.99	0.39		1.64	2.71	15.64	18.85	3.81	3.38	39.98	0.87	1.19	0.19	0.1	
86	Navy general hospital 4413	China	Beijing	2009	*A. baumannii*	sputum	0.08	4.2	0.62	0.27	1.98	2.92	1.42	0.73	0.24	1.54	2.94	12.76	19.05	2.94	2.83	41.94	0.99	0.98	0.71		0.47
87	Navy general hospital 4449	China	Beijing	2009	*A. baumannii*	sputum		4.9	0.62		2.04	3.21	0.59			0.98	3.21	11.75	21.18	1.67	1.86	45.58	0.83	0.73			0.91
88	Navy general hospital 4681	China	Beijing	2009	*A. baumannii*	sputum	0.05	3.1	0.42	0.09	1.29	2	1.31	0.41	0.24	0.76	2.22	20.14	18.15	2.01	1.27	41.32	1	1.14	0.49	0.37	0.74
89	Qinghai 1	China	Qinghai	2009	*A. baumannii*	sputum	0.06	3.6	0.47	0.3	1.69	2.53	1.4	0.55	0.16	2.46	2.43	13.65	19.5	4.14	3.13	40.32	0.98	1.48	0.46		

90	Qinghai 2	China	Qinghai	2009	*A. baumannii*	sputum	0.05	3.3	0.39	0.23	1.61	2.4	0.96	0.48	0.11	1.8	2.07	13.02	17.87	4.93	3.07	35.09	0.69	0.72	0.3	0.26	0.59
91	Qinghai 4	China	Qinghai	2009	*A. baumannii*	sputum	0.06	3.8	0.48	0.22	1.61	2.56	1.11	0.49	0.15	1.7	2.23	14.6	21.18	4.61	2.11	39.52	1.14	1.27	0.44		
92	Qinghai 5	China	Qinghai	2009	*A. baumannii*	secretion	0.07	3.4	0.45		1.1	2.64	1.07	0.14		0.26	2.57	18.22	17.38	1.06	0.46	46.22	1.22	1.35	0.31	0.16	0.85
93	Qinghai 6	China	Qinghai	2009	*A. baumannii*	sputum	0.07	4.2	0.53	0.26	1.92	2.74	1.03	0.36	0.1	1.82	2.22	14.12	20.48	3.5	2.59	41.49	0.76	0.81	0.26		0.5
94	Qinghai 7	China	Qinghai	2009	*A. baumannii*	sputum	0.08	4.4	0.5	0.23	1.93	2.81	1.11	0.42	0.14	1.66	2.19	15.2	21.57	3.26	2.21	39.74	0.78	1.03	0.41		
95	Qinghai 11	China	Qinghai	2009	*A. baumannii*	sputum	0.07	4.5	0.55	0.27	1.99	2.96	0.89	0.36	0.09	1.87	2.29	14.73	19.93	3.26	2.45	41.16	0.69	0.76	0.26	0.22	0.5
96	Qinghai 12	China	Qinghai	2009	*A. baumannii*	sputum	0.06	3.9	0.52	0.26	1.72	2.43	0.54	0.25		1.74	2.21	13.62	19.11	4.05	2.77	36.48	0.65	0.57			0.53
97	Qinghai 13	China	Qinghai	2009	*A. baumannii*	sputum	0.06	4	0.58	0.23	1.8	2.63	0.42	0.26		1.7	2.67	13.51	20.63	2.97	2.98	43.68	0.71	0.77			
98	Qinghai 14	China	Qinghai	2009	*A. baumannii*	sputum	0.06	3.9	0.55	0.26	1.9	2.81	1.02	0.43	0.11	2.28	2.2	14.56	19.63	4	2.61	40.8	0.82	0.72	0.31	0.27	0.48
99	Qinghai 15	China	Qinghai	2009	*A. baumannii*	sputum	0.08	3.3	0.49	0.19	1.43	2.19	1.19	0.46	0.13	1.94	1.97	12.25	22.59	4.4	3.69	38.66	0.89	1.9	0.34	0.27	0.44
100	Qinghai 17	China	Qinghai	2009	*A. baumannii*	sputum	0.07	4.5	0.61	0.27	2.05	2.88	0.94	0.25		1.77	2.12	14.54	20.38	3.4	2.44	41.23	0.74	0.74	0.16	0.1	0.51
101	Shijiazhuang 1174	China	Hebei	2009	*A. baumannii*	sputum	0.09	5.4	0.71	0.18	2.42	3.73	1.42	0.71	0.22	0.77	3.42	13.43	15.7	2.61	2.45	42.33	0.87	2	0.64		0.55
102	Shijiazhuang 1182	China	Hebei	2009	*A. baumannii*	sputum	0.07	3.7	0.53	0.13	1.47	2.53	1.34	0.42	0.17	1.14	2.34	17.34	16.78	2.23	1.31	42.75	1.47	1.18		0.34	0.94
103	Shijiazhuang 1198	China	Hebei	2009	*A. baumannii*	sputum	0.09	4	0.49	0.2	1.85	2.77	1.45	0.68	0.3	1.34	2.75	12.74	19.36	2.47	2.77	44.04	0.79	1.22			
104	Shijiazhuang 1301	China	Hebei	2009	*A. baumannii*	sputum	0.1	4.2	0.56	0.21	1.96	2.97	1.49	0.72	0.3	1.23	3.02	11.27	19.04	2.32	2.65	44.39	0.88	2.2			0.46
105	Shijiazhuang 1306	China	Hebei	2009	*A. baumannii*	sputum	0.09	3.5	0.51	0.18	1.6	2.44	1.69	0.86	0.36	1.23	2.46	11.52	21.24	2.48	2.78	41.23	1.3	4.27			
106	Shijiazhuang 1315	China	Hebei	2009	*A. baumannii*	sputum	0.07	4	0.48	0.19	1.73	2.65	1.27	0.45	0.14	1.2	2.51	10.86	20.52	2.65	3.03	42.64	0.93	3.23	0.46	0.36	
107	Shijiazhuang 1318	China	Hebei	2009	*A. baumannii*	sputum	0.08	5.2	0.74	0.24	2.16	3.46	0.52	0.35		1.28	3.17	14.11	16.2	2.76	2.65	44.68	0.7	0.72			0.57
108	Shijiazhuang 1322	China	Hebei	2009	*A. baumannii*	Wound swab	0.09	3.9	0.56	0.19	1.74	2.69	1.97	0.93	0.44	1.02	2.66	12.07	20.32	2.1	2.19	41.66	1.27	3.81			
109	Shijiazhuang 1325	China	Hebei	2009	*A. baumannii*	sputum		4.8	0.66	0.21	2.06	3.26	0.46	0.29		1.11	3.02	13.91	18.8	2.31	2.26	45.13	0.68	0.82			
110	Shijiazhuang 1327	China	Hebei	2009	*A. baumannii*	sputum	0.09	4.1	0.54	0.23	1.83	2.75	1.54	0.6	0.21	1.33	2.67	12.67	19.2	3.05	2.9	41.31	1.17	2.78	0.58		
111	Shijiazhuang 1337	China	Hebei	2009	*A. baumannii*	sputum	0.11	4.2	0.58	0.27	1.76	3	1.21	0.72	0.24	1.98	2.14	10.76	19.66	3.08	4.06	41.72	0.65	1.57	0.69	0.6	0.51
112	Shijiazhuang 1338	China	Hebei	2009	*A. baumannii*	sputum	0.06	3.6	0.52	0.18	1.65	2.44	1.83	0.76	0.35	1.04	2.3	10.7	21.81	2.18	2.5	40.34	1.29	5.56			0.52
113	Shijiazhuang 137	China	Hebei	2009	*A. baumannii*	sputum	0.07	4.4	0.65	0.22	1.94	2.87	0.54	0.26		1.29	2.72	12.15	18.27	2.8	2.86	46.59	0.63	1.04			0.48
114	Shijiazhuang 171	China	Hebei	2009	*A. baumannii*	sputum	0.1	4.3	0.57	0.21	1.83	3.11	1.51	0.83	0.3	1.62	2.32	10.89	20.35	2.87	3.52	39.91	1.08	2.51	0.89	0.79	
115	Shijiazhuang 175	China	Hebei	2009	*A. baumannii*	secretion		3.8	0.53	0.17	1.71	2.63	1.65	0.7	0.31	1.02	2.62	11.21	20.36	2.43	2.66	42.51	1.13	3.92			
116	Shijiazhuang 181	China	Hebei	2009	*A. baumannii*	sputum	0.08	4.1	0.56	0.19	1.9	2.8	1.75	0.86	0.36	1.18	2.86	10.8	19.2	2.29	2.62	43.2	1.14	3.27			0.41
117	Shijiazhuang 192	China	Hebei	2009	*A. baumannii*	sputum	0.08	4.4	0.66	0.31	1.9	2.83	0.39	0.45		1.67	0.08	12.2	17.4	3.55	4.05	44.83	0.63	0.77			0.55
118	Shijiazhuang 194	China	Hebei	2009	*A. baumannii*	sputum	0.05	3.5	0.44	0.08	1.32	2.45	1.28	0.45	0.22	0.5	2.4	17.55	15.71	2.35	0.96	44.35			0.58		0.68
119	Shijiazhuang 195	China	Hebei	2009	*A. baumannii*	sputum	0.11	4.7	0.65	0.25	2.09	3.26	0.49	0.29		1.37	3.04	12.13	18.01	2.61	2.96	46.47	0.62	0.95			
120	Shijiazhuang 200	China	Hebei	2009	*A. baumannii*	sputum	0.07	3.2	0.4	0.08	1.14	2.28	1.3	0.47	0.25	0.58	2.27	17.26	17.05	2.33	0.93	43.93	1.22	1.61	0.58	0.46	0.84
121	Suzhou 12	China	Jiangsu	2009	*A. baumannii*	sputum	0.08	3.7	0.24	0.24	1.6	2.21	1.99	1.02	0.42	1.61	2.19	11.35	20.1	3.64	2.91	38.65	1.48	4.07	1.26	1.13	
122	Suzhou 26	China	Jiangsu	2009	*A. baumannii*	sputum	0.07	3.4	0.51	0.17	1.62	2.41	1.57	0.74	0.33	1.16	2.48	11.8	20.55	2.51	2.65	41.08	1.2	3.58	0.92	0.83	

123	Suzhou 30	China	Jiangsu	2009	*A. baumannii*	sputum		3.3	0.44		1.61	2.39	2.22	1.06	0.5	1.21	2.48	12.56	23.77	2.07	1.89	38.38	1.46	4.21			
124	Suzhou 31	China	Jiangsu	2009	*A. baumannii*	sputum	0.11	3.8	0.59		1.71	2.73	2.43	1.03	0.56	0.68	2.82	11.84	21.16	2.06	1.33	37.56	1.7	4.33	1.61	1.42	
125	Suzhou 33	China	Jiangsu	2009	*A. baumannii*	sputum	0.06	3	0.38	0.23	1.44	2.11	1.42	0.67	0.22	1.86	2.2	13.45	20.6	3.78	3.61	40.1	1.07	2.53	0.66		
126	Suzhou 5	China	Jiangsu	2009	*A. baumannii*	sputum		4.6	0.49	0.3	1.72	3.11		1.32	0.59	1.52	2.06	11.51	17.11	4.04	4.4	37.85	1.31	4.37	1.64	1.45	
127	Xian 1	China	Shanxi	2009	*A. baumannii*	sputum	0.07	4.1	0.56	0.21	1.86	2.87	0.54	0.27		1.4	2.72	12.36	19.46	2.9	3.1	45.49	0.64	0.74			0.5
128	Xian 2	China	Shanxi	2009	*A. baumannii*	sputum	0.05	3.4	0.43	0.17	1.59	2.38	1.26	0.57	0.24	1.16	2.35	12.04	20.82	2.77	2.74	43.35	0.97	2.3	0.66		0.44
129	Xian 6	China	Shanxi	2009	*A. baumannii*	sputum	0.11	4.6	0.57	0.19	1.76	3.28	0.67	0.37		1.33	2.33	14.46	19.59	4.34	3.79	40.8	0.81	0.94			
130	Xian 7	China	Shanxi	2009	*A. baumannii*	sputum	0.06	4.1	0.59	0.18	1.87	2.77	1.37	0.63	0.29	1.2	2.75	9.63	21.3	2.1	2.29	45	0.73	0.97	0.82	0.71	0.51
131	Xian 8	China	Shanxi	2009	*A. baumannii*	sputum		3.9	0.46	0.3	1.69	2.87	2.78	1.48	0.68	1.51	2.19	11.6	21.07	3.3	3.57	35.54	1.52	5.17			
132	Xian 9	China	Shanxi	2009	*A. baumannii*	sputum	0.1	4.2	0.57	0.24	1.78	3.1		1.3	0.51	1.6	2.34	14.01	18.12	5.6	4.61	36.32	1.04	1.2	1.44	1.25	
133	Xian 10	China	Shanxi	2009	*A. baumannii*	sputum	0.09	3.7	0.54	0.18	1.65	2.48	2.25	1.03	0.51	1.17	2.49	12.3	19.15	2.74	2.69	40.26	2.11	4.04			
134	Xian 13	China	Shanxi	2009	*A. baumannii*	sputum	0.06	4.3	0.55	0.17	1.91	2.9	1.36	0.64	0.25	1.46	2.75	12.67	18.7	3.08	2.92	42.46	0.91	1.25	0.74		0.51
135	Xian 14	China	Shanxi	2009	*A. baumannii*	sputum	0.07	3.2	0.77		0.97	2.58	1.41	0.35	0.19	0.21	1.91	15.11	19.47	0.8	0.51	43.37	1.45	5.32	0.46	0.39	0.69
136	Xian 15	China	Shanxi	2009	*A. baumannii*	sputum	0.11	3.4	0.44	0.19	1.58	2.5	2.63	1.16	0.59	1.25	2.47	10.75	21.12	2.37	2.78	38.97	1.45	4.1	1.7		
137	Xian 17	China	Shanxi	2009	*A. baumannii*	sputum	0.07	3.7	0.53	0.29	1.71	2.59	1.83	0.94	0.4	1.33	2.6	10.78	18.58	3.04	3.17	41.9	1.15	3.25	1.17		0.45
138	Xian 18	China	Shanxi	2009	*A. baumannii*	sputum	0.11	5.2	0.71	0.23	2.31	3.64		1.32	0.61	1.12	3.55	8.55	18.68	2.59	2.47	42.2	1.01	1.28	1.61	1.48	0.51
139	Xian 20	China	Shanxi	2009	*A. baumannii*	sputum	0.11	5.2	0.65	0.16	2.2	3.49	1.57	0.72	0.3	0.92	3.32	9.97	18.57	1.73	1.91	43.8	1	2.5	0.84		0.59
140	Xian 22	China	Shanxi	2009	*A. baumannii*	sputum	0.07	3.9	0.51	0.07	1.47	2.67	1.03	0.38	0.15	0.3	2.55	20.5	13.9	1.82	0.63	44.04	1.57	1.43	0.38	0.29	1.01
141	Xian 24	China	Shanxi	2009	*A. baumannii*	sputum	0.11	4.2	0.6	0.27	1.89	2.85		0.89	0.35	1.37	2.8	12.59	16.37	3.46	3.37	43.36	0.88	1.49	1.01	0.87	0.52
original ID	isolate	country	location	year	**species**	**source**	10:00	12:00	unknown 12.484	13:00	12:0 2OH	12:0 3OH	14:00	Sum In Feature 1	15:1 ANTEISO A	15:00	Sum In Feature 2	Sum In Feature 3	16:00	17:1 w8c	17:00	18:1 w9c	18:1 w7c	18:00	13:0 ISO 3OH	15:1 ISO F	16:1 w9c
1	Air force general hospital 3146	China	Beijing	2009	*A.calcoaceticus*	sputum		5	0.76		2.25	3.7	1.3			1.76	3.44	29.97	21.14	2.1	0.8	25.51	2.33				
2	Changchun R281	China	Jilin	2009	*A.calcoaceticus*	sputum	0.08	5	0.91	0.29	2.23	3.07	0.91	0.23		1.87	1.38	21.63	19.81	4.74	2.25	32.9	1.27	0.88	0.09	0.07	
3	Gansu S1006	China	Gansu	2009	*A.calcoaceticus*	sputum	0.07	4.7	0.54	0.28	2.05	2.94	1.98	0.47	0.18	1.71	2.17	30.19	19.68	2.19	0.66	25.54	2.67	1.14	0.49		
4	Gansu S1022	China	Gansu	2009	*A.calcoaceticus*	sputum		5.1	0.72	0.55	2.38	3.53	1.54	0.68		2.49	3.15	29.25	19.64	4.06	1.02	22.87	2.45				
5	Gansu S1024	China	Gansu	2009	*A.calcoaceticus*	sputum		4.8	0.61	0.35	2.15	3.08	2.1	0.52		1.95	2.82	29.68	20.39	2.5	0.91	22.97	2.6	1.33	0.45	0.31	
6	Gansu S1099	China	Gansu	2008	*A.calcoaceticus*	sputum	0.11	4.3	0.54	0.29	1.92	2.89	2.99	1.05	0.5	1.51	2.76	22.58	23.12	2.15	1.12	21.39	2.98	5.9	1.42		
7	Gansu S14501	China	Gansu	2009	*A.calcoaceticus*	sputum		5.1	0.62	0.35	2.2	3.38	1.27	0.39		1.96	3	30.04	20.5	2.51	0.9	24.82	2.54				
8	Gansu S227	China	Gansu	2009	*A.calcoaceticus*	sputum	0.07	4.9	0.66	0.28	2.17	3.29	1.9	0.65	0.17	1.92	2.97	26.97	20.81	3.28	1.1	24.04	3.44	0.37	0.55		
9	Gansu S869	China	Gansu	2008	*A.calcoaceticus*	sputum		4.4	0.6	0.25	1.98	3.12	3.03	1.14	0.56	1.45	2.9	25.54	20.69	1.93	0.85	23.26	2.91	3.15	1.56		
10	Gansu S871	China	Gansu	2009	*A.calcoaceticus*	sputum		5.2	0.68	0.29	2.22	3.48	1.24	0.31		1.76	3.17	28.3	21.37	2.49	0.87	26	2.37				
11	Guangzhou 830	China	Guangdong	2009	*A.calcoaceticus*	sputum	0.07	3.8	0.4	0.09	1.12	2.75	1.13	0.22		0.52	2.63	22.09	15.13	3	0.71	40.1	3.68	0.63	0.23	0.21	
12	Hospital 301 2325	China	Beijing	2008	*A.calcoaceticus*	sputum	0.04	3.9	0.43	0.24	1.49	2.48	1.33	0.59	0.16	1.86	2.66	25.1	13.87	5.27	1.69	34.62	1.19	0.55	0.42	0.36	
13	Hospital 301 2326	China	Beijing	2008	*A.calcoaceticus*	sputum	0.22	3.7	0.5	0.25	1.73	2.57	4.36	1.17	0.67	1.46	2.46	22.69	22.67	1.91	0.99	20.64	3.4	7.5			
14	Hospital 301 2327	China	Beijing	2009	*A.calcoaceticus*	sputum		4.1	0.51	0.29	1.92	2.97	2.54	0.82		1.74	2.86	26.42	21.08	1.89	0.86	24.01	3.1	3.18	0.96	0.77	

15	Hospital 301 2328	China	Beijing	2008	*A.calcoaceticus*	sputum		4.5	0.64	0.21	2.14	3.22	3.51	1.41	0.67	1.55	3.14	23.02	21.04	2.74	1.25	22.1	2.59	5.62			
16	Hospital 301 2332	China	Beijing	2009	*A.calcoaceticus*	sputum		3.6	0.91		1.08	2.7	2.52	0.54	0.36	0.37	1.87	32.86	16	0.76	0.3	24.17	4.79	3.48	0.97		
17	Hospital 301 2343	China	Beijing	2009	*A.calcoaceticus*	sputum		3.8	0.47	0.27	1.72	2.6	2	0.88	0.38	2.1	2.43	25.81	22.61	5.45	3.16	20.59	2.81	1.4	1.06		
18	Hospital 301 2350	China	Beijing	2009	*A.calcoaceticus*	sputum	0.04	2.8	0.35		1.39	1.98	1.38	0.07		0.25	1.97	24.37	20.28	1.31	0.38	38.96	2.05	0.84	0.21	0.07	
19	Hospital 301 2359	China	Beijing	2009	*A.calcoaceticus*	sputum		5.1	0.72	0.24	2.34	3.44	3.05	1.26	0.6	1.58	3.32	24.85	21.59	2.6	1.12	22.9	2.12	2.79			
20	Hospital 301 2362	China	Beijing	2008	*A.calcoaceticus*	sputum		4.6	0.61	0.33	2.03	3.02	2.63	0.93	0.42	1.97	2.88	28.86	20.08	2.34	0.94	24.13	2.37		1.2		
21	Navy general hospital 4592	China	Beijing	2009	*A.calcoaceticus*	sputum	0.08	4.1	1.07		1.18	3.29	2.78	0.89	0.48	0.33	2	30.33	16.65	0.74	0.26	27.36	2.53	3.2	1.46		
22	Navy general hospital 3397	China	Beijing	2009	*A.calcoaceticus*	sputum	0.07	5.4	0.65	0.33	2.35	3.43	2.11	0.8		1.77	3.08	30.93	18.82	3.19	0.93	22.33	2.17	0.58	0.55		
23	Navy general hospital 4379	China	Beijing	2009	*A.calcoaceticus*	sputum		5.5	0.69	0.25	2.55	3.58	3.06	1.26	0.57	1.56	3.17	26.36	20.46	2.92	1.03	24.27	2.13	0.67			
24	Navy general hospital 4410	China	Beijing	2009	*A.calcoaceticus*	sputum	0.07	4.7	0.54	0.28	2.05	2.94	1.98	0.47	0.18	1.71	2.17	30.19	19.68	2.19	0.66	25.54	2.67	1.14	0.49		
25	Qinghai 10	China	Qinghai	2009	*A.calcoaceticus*	sputum	0.06	5	0.52	0.25	2.12	3.03	1	0.29		2.06	1.99	27.26	21	6.06	2.41	23.33	1.95	0.09	0.14	0.11	
26	Qinghai 8	China	Qinghai	2009	*A.calcoaceticus*	sputum	0.08	3.5	0.46	0.1	1.63	2.72	0.94	0.2		1.81	1.95	20.62	23.5	4.21	1.89	34.69	1.19	0.14			
27	Shijiazhuang 1137	China	Hebei	2009	*A.calcoaceticus*	sputum		3.6	0.37		1.13	3.67	1.52	0.42		0.28	0.67	22.95	15.88	1.99	1.9	28.37	8.45	2.39		0.47	1.58
28	Shijiazhuang 199	China	Hebei	2009	*A.calcoaceticus*	sputum	0.11	5.1	0.64	0.16	2.18	3.25	1	0.21		1.36	2.76	20.52	21.68	2.82	2.01	32.59	1.96	0.58			
29	Suzhou 18	China	Jiangsu	2009	*A.calcoaceticus*	sputum	0.06	4.4	0.54	0.25	1.95	2.97	1.72	0.59	0.22	1.92	2.65	25.4	20.42	2.73	1.02	28.25	2.17	1.11	0.63	0.56	
30	Xian 11	China	Shanxi	2009	*A.calcoaceticus*	sputum	0.09	4	0.55	0.28	1.79	2.57	1.15	0.5	0.15	2.08	2.48	18.37	20.84	4.55	2.69	35.64	0.88	0.32	0.39	0.31	
31	Xian 19	China	Shanxi	2009	*A.calcoaceticus*	sputum	0.08	4.6	0.63	0.34	2.08	3.06	2.73	1.03	0.43	2.07	2.96	27.49	19.04	2.92	0.92	23.38	2.75	1.69	1.22		
32	Xian 4	China	Shanxi	2009	*A.calcoaceticus*	sputum	0.12	3.9	0.46	0.07	1.37	3.16	1.13	0.45	0.24	0.61	2.03	24.74	14.66	2.6	0.78	36.49	1.37	1.3	0.51		