Bacteroides fragilis ja fenotüübiline karbapeneemresistentsus kui esilekerkiv probleem

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30.03.2023

Tartu

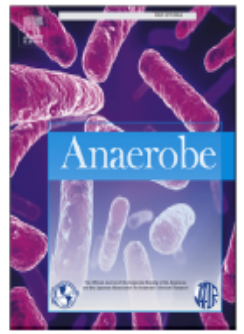
KM ja EUCAST sektsiooni koosolek

Anaerobe 76 (2022) 102606

Contents lists available at ScienceDirect

Anaerobe

journal homepage: www.elsevier.com/locate/anaerobe



Review Article

Carbapenem resistance in *Bacteroides fragilis:* A review of molecular mechanisms

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Table 1
Frequency of carbapenems resistant *B. fragilis* from different countries after 2000.

Country	Year	Isolates number	Specimens (source of isolates)	Methods	Standard	Frequency of resistance				*cfiA* frequency	IS	Ref
						IMI	MRP	ERT	DOR	(%)		
China	2009–2019	44	Abdominal and faecal	Agar Dilution	CLSI	18.2	29.5	22.7	NT	36.4	IS1187, IS613	[10]
China	2017–2019	80	Intra-abdominal, pelvic infections, blood, skin and soft tissue and pulmonary	Broth Microdilution	CLSI	25.1	22.6	NT	NT	38.9	IS1187, IS942, IS1169	[61]
USA	2006–2007 and 2008 –2009	1021	Wound, abdominal fluid, peritoneal fluid, blood, tissue, pelvic fluid, pilon cyst and appendix	Agar Dilution	CLSI	0.5 –1.1	1.6 –2.5	1.6 –2.5	1.3 –2.3	86.7[b]	IS1170	[62]
Denmark	2014–2015	64	Faecal samples from patients receiving broad-spectrum antibiotics	E-Test	EUCAST	NT	2%	NT	NT	5.3	NT	[52]
Denmark	2002–2005	317	Blood and various anatomic structures*	E-Test	EUCAST	NT	2.2	NT	NT	4.4	NT	[63]
Spain	2006 to 2010	414	Surgical wound, ulcer exudate, peritoneal fluid, abscess and blood	E-Test	CLSI	1.8	NT	4.1	NT	0.72	ND	[64]
Belgian	2004	135	Abdominal, wounds, pus, abscesses, blood, gynaecological	E-Test	CLSI	NT	7	NT	NT	6.7	NT	[65]
	2011–2012	69	and obstetrical, respiratory tract, central nervous system, ear and sinus and miscellaneous other sites**	E-Test	CLSI	NT	13	NT	NT	2.8	NT	
Turkey	2003–2008	66	Abdomen, skin and soft tissue, blood, and various other sites	Agar Dilution	CLSI	6	7.5	NT	NT	27	IS1187 IS4351	[66]
Japan	2014–2019	50	Blood	Broth Microdilution	CLSI	54	10	NT	10	10	IS612B, IS1188	[67]
Argentina	2006–2009	198	Abdomen, genital tract, blood, skin and soft tissues and other body sites	Agar Dilution	CLSI	1.5	NT	2.4	1.9	4.04	NT	[68]
Kuwait	2006–2018	421	Wound infections, respiratory tract infections, Blood, biopsy, urine, and bile	E-Test	CLSI	11	17	NT	NT	16.2	NT	[69]
Slovenian	2015–2017	623	Blood, wounds and abdominal	E-Test	EUCAST	1.3	NT	NT	NT	8.2	IS942 IS1187	[70]
Hungary	2014–2016	233	Wound, abdominal; abscess, blood and gynaecological, middle ear, cerebrospinal fluid and pericardial fluid	Agar Dilution	EUCAST	NT	15.02	NT	NT	8.58	NT	[53]
Canada	2010–2011	232	Wound, blood and respiratory	Broth Microdilution	CLSI	0.9	NT	3	NT	ND	ND	[71]
Taiwan	2006	60	Blood	Agar Dilution	CLSI	12	7	10	12			[72]
Iran	2018–2019	22	Abdominal, wound, blood, pleural effusion, joint infection and other infections	Agar Dilution	CLSI	1.8	1.8	NT	NT	14.1	IS1186	[73]

Abbreviations: CLSI - Clinical and Laboratory Standards Institute, DOR - doripenem, ERT - ertapenem, EUCAST - European Committee on Antimicrobial Susceptibility Testing, IMI – imipenem IS- insertion sequence, MRP - meropenem, NT - not tested.[b] The *cfiA* gene has been detected only in the resistant isolates.*Not determined.**Various anaerobe bacteria have been included in the study and it has not been determined each genus or species has been isolated from which specimens.

5 mechanisms of *B. fragilis* resistance to carbapenems

- The resistance to b-lactam drugs in *B. fragilis* is occurred due to various molecular mechanisms such as:
  - the production of b-lactamases. The two most important b-lactamases in *B. fragilis* are
    - encoded by cepA (encoding a b-lactamase of Ambler's class A)
    - **cfiA** (encoding an MBL of Ambler's class B) genes with different affinities to different classes of b-lactams
  - inhibition of the b-lactam antibiotic activity by hydrolyzing the amide group of the b-lactam ring
  - overexpression of the multidrug efflux pump
  - changes in outer membrane permeability
  - low affinity of its PBPs to some b-lactams

TÜK labori 2022.aasta andmed *B. fragilis* ja *B. fragilis grupp* imipeneem resistentne (Gradient-test)

- Kokku 3 tüve: 2 *B. fragilis* (R 2%), 1 *B. thetaiotaomicron* (R 2%)
- Proovimaterjal:
  - haavaeritis 1
  - koematerjal 1
  - kõhuõõnevedelik 1
- Osakonnad:
  - üldkirurgia ja plastilise kirurgia osakond 1
  - gastroenteroloogia osakond 2

PERH labori 2022 andmed *B. fragilis* ja *B. fragilis grupp* Ertapeneem resistentne (Gradient-test)

- Kokku 31 tüve (R 11%):
  - *B. vulgatus* 8 (R 3%)
  - B. *fragilis* 7 (R 2%)
  - *B. thetaiotaomicron* 7 (R 2%)
  - *B. faecis* 3 (R 1%)
  - *B. uniformis* 3 (R 1%)
  - *B. ovatus* 2
  - *B. distasonis* 1
- Proovimaterjal:
  - haavaeritis 17
  - kõhuõõnevedelik 5
  - abstsess 6
  - veri 1
  - fistlieritis 1
  - emakaõõne eritis 1

PERH labori 2022 andmed *B. fragilis ja B. fragilis grupp* Ertapeneem resistentne (Gradient-test)

- Osakonnad:
  - Anesteesiaosakond 3
  - Günekoloogiaüksus 1
  - Hematoloogiaosakond 1
  - IRO 2
  - Kirurgia 6
  - Kirurgi vastuvõtt 3
  - Kirurgilise järelravi üksus Hiiul 3
  - Nefroloogiaosakond 1
  - Onkoloogilise järelravi üksus 1
  - II taastusravi osakond 1
  - Pulmonoloogia 2
  - Sept.luu-liigesekirurgi amb 1
  - Septilise ortopeedia üksus 1
  - Vastuvõtt EMO 5

ITK labori 2022.aasta andmed *B. fragilis* meropeneem resistentne

- Kokku 12 tüve
- Proovimaterjal:
  - haavandi eritis 5,
  - mäda, abstsessi materjal ja haavaeritis 6
  - veri 1
- Osakonnad:
  - ambulatoorne kirurgia 4
  - sisehaiguste osakond 1
  - õendusabi osakond 2
  - günekoloogia osakond 2
  - kirurgia osakond 3

Kui suur on probleem Eestis?

- Kas peame retrospektiivselt hindama oma laborite tulemusi?
- Kas on kliiniline probleem?
- Kas oleks mõistlik tüvede sügavkülmutamine mingi perioodi vältel?
- Milliseid täpsemaid uuringuid oleks võimalik ette võtta?