Rex Laboratory BULLETIN

April - June 2014

UPDATES AND INFORMATION FROM REX PATHOLOGY LABORATORY

Issue Number 202

NC-Specific Respiratory Allergen Panel

Mayo Medical Laboratories (MML) recently announced the creation of region-specific respiratory allergen panels.[1] As a result, there is now a panel designed for common respiratory allergens in North Carolina as designated below. The formal name for it is Respiratory Profile, Region 2, Mid-Atlantic (MML Test Code RPR2). The current charge is $198. Accordingly, requests for "Southeastern United States" or "Respiratory" allergy panel testing without further specification will result in the ordering of the panel below. A more detailed discussion of allergy testing available through MML was presented in an earlier Laboratory Bulletin.[2]

Respiratory Profile, Region 2, Mid-Atlantic (DC, DE, MD, NC, VA)
Immunoglobulin E (IgE)
House Dust Mites/ *Dermatophagoides pteronyssinus*
House Dust Mites/ *Dermatophagoides farinae*
Cat Epithelium
Dog Dander
Bermuda Grass
Timothy Grass
Johnson Grass
Cockroach
Penicillium chrysogenum
Cladosporium
Aspergillus fumigatus
Alternaria tenuis
Box Elder/Maple
Silver Birch
Mountain Cedar
Oak
Elm
Cottonwood
Pecan,
Hickory
Mulberry
Short Ragweed
Rough Pigweed
Red Sorrel

John D. Benson, M.D.

References

1. *Mayo Medical Laboratories. New Test Announcements. Communiqué Vol 39 No 3, May/June 2014.*
2. *Benson JD, Griffin R, Brown D. Allergy Testing at Rex (Mayo) Laboratory. Rex Laboratory Bulletin Issue 189, Sept 2012.*

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REX UNC HEALTH CARE

Creatinine Clearance Discontinued

We will discontinue the "creatinine clearance" test in June, coincident with the implementation of the EPIC hospital information system. Requests for this test have decreased significantly since we began reporting estimated Glomerular Filtration Rate along with serum creatinine values.[1,2] Many laboratories (including UNC Hospitals Laboratory) have already discontinued creatinine clearance testing. The advantages and limitations of creatinine-based estimation equations for evaluating renal function are reviewed in detail elsewhere for the interested reader.[1-3]

The Laboratory will continue to offer measurement and reporting of urine creatinine *concentration*, total urine creatinine *excretion* and urine *volume* for 24 hour urine collections, so that interested parties may be able to calculate creatinine clearance on their own, if a serum creatinine is ordered concurrently. Outreach orders for "creatinine clearance" will be converted to orders for 24 hr urine creatinine and serum creatinine so that these same data can be used to permit calculation of the creatinine clearance by the ordering physician.

The formula below does not correct for body surface area.

$$\text{Creatinine clearance} = \frac{\text{Urine Cr (mg/dL)} \times \text{Urine vol (mL)}}{\text{Serum Cr (mg/dL)} \times \text{Time (Hrs)} \times 60}$$

Online calculators are available to assist with this function.[4,5]

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References

1. *Benson JD. Estimated glomerular filtration rate (EGFR). Rex Laboratory Bulletin. Issue 139. June 2008. http://www.rexhealth.com/workfiles/services/lab/Jun2008LB.pdf*
2. *Volmar KE. IDMS-traceable creatinine. Rex Laboratory Bulletin. Issue 177. September 2011. http://www.rexhealth.com/workfiles/services/lab/Sep2011LB.pdf*
3. *Lascano ME, Poggio ED. Kidney function assessment by creatinine-based estimation equations. Cleveland Clinic Disease Management Project. http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/nephrology/kidney-function/*
4. *University of Iowa Healthcare Pathology Laboratory. Creatinine clearance calculator. (Uncorrected for Body Surface Area) https://www.healthcare.uiowa.edu/path_handbook/Appendix/Calculators/creat_clear.html*
5. *Cornell University Medical College Critical Care Pediatrics. Creatinine clearance calculator. (Can correct for Body Surface Area) http://www-users.med.cornell.edu/~spon/picu/calc/crclcalc.htm*

Rex Healthcare Cumulative Antibiogram Summary 2014 (Organisms Isolated During Calendar Year 2013)

Here are the results of the Rex Healthcare 2014 Cumulative Antibiogram. The findings are briefly summarized below.

Target Pathogen Trends (Non-Urine Sources)

Vancomycin-Resistant *Enterococcus faecium* (VRE)

There was a decrease in the number of vancomycin-resistant Enterococcus faecium isolates (39.1% of non-urine Enterococcus faecium isolates in 2013, compared to 63.2% in 2012). However, there were too few isolates to draw any meaningful conclusions regarding trends in susceptibility.

Oxacillin-Resistant *Staphylococcus aureus* (ORSA, MRSA)

The number of resistant isolates remained stable at 52%.

Extended-Spectrum Beta-Lactamase-Producing Organisms (ESBLs)

There was an increase in the number of ESBL-producing Escherichia coli and Klebsiella pneumoniae isolates in 2013 (Escherichia coli: 14% of E coli isolates in 2013, compared to 8.9% in 2012; Klebsiella pneumoniae: 14% of K pneumo isolates in 2013, compared to 8.5% in 2012). It is important to note that ESBL-producing organisms also tended to express multiple resistance mechanisms, conferring co-resistance to aminoglycosides, fluoroquinolones and TMP/SMX, in many cases. Overall, there were too few isolates to draw any meaningful conclusions regarding susceptibility trends.

Acinetobacter baumannii

There were 53% fewer isolates in 2013 than in 2012 (7 versus 15, respectively). Because of the small number of isolates, it is difficult to draw any meaningful conclusions regarding susceptibility trends.

Pseudomonas aeruginosa

There were 29% fewer isolates in 2013 than in 2012 (69 versus 97, respectively). There were no alarming susceptibility trends.

Enterobacter aerogenes and Enterobacter cloacae complex
The number of isolates was approximately 50% lower in 2013, compared to 2012 (33 versus 62, respectively). In 2013, isolates of Enterobacter aerogenes were less susceptible to ceftriaxone, meropenem and fluoroquinolones than in 2012, while there were no losses in susceptibility for Enterobacter cloacae complex.

Specific Drug Comments

Clinicians should note that fluoroquinolone antibiotics performed very poorly against gram-positive organisms (both urines and non-urines) with respect to susceptibility, so fluoroquinolones would be a relatively poor choice for empiric coverage of infections suspected to be caused by gram-positive organisms (except Streptococcus pneumoniae). Nitrofurantoin performed very poorly against most gram-negative organisms (urines only), with the exception of Escherichia coli. Of note, the number of carbapenem-resistant Enterobacteriaceae (CRE) doubled in 2013, compared to 2012 (6 versus 3 isolates, respectively). There are very limited treatment options for patients with CRE infections.

General Comments and Limitations

It is difficult to draw meaningful conclusions with regard to trends in susceptibility for some species, as the overall number of isolates was small (fewer than 30, or even fewer than 15 in some cases). Other than those noted above, there were no significant or alarming trends in susceptibility relative to the prior year.

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2014 REX HEALTHCARE ANTIBIOGRAM
January - December 2013 Data

	OTHER SOURCES - Not URINE or BLOOD												URINE ISOLATES						
		Beta Lactams					Quinolones		Misc										
		Penicillins			Cephs														
Gram-Positive Organisms	**# Isolates**	Ampicillin[1]	Oxacillin	Penicillin[2]	Cefotaxime non-CSF	Ceftriaxone non-CSF	Ciprofloxacin	Levofloxacin	Clindamycin[3]	Vancomycin	Tetracycline	TMP/SMX[5]	Erythromycin	**# Isolates**	Ampicillin	Ciprofloxacin	Levofloxacin	Nitofurantoin[4]	Tetracycline	TMP/SMX
Enteroccocus faecalis	**83**	100					•	•		100	•		•	**235**	100	•	•	100	•	
Enteroccocus faecalis, Vancomycin Resistant (VRE)	**1**	100					•	•		0	•		•	**2**	100	•	•	100	•	
Enteroccocus faecium	**14**	43					•	•		100	•		•	**11**	9	•	•	0	•	
Enteroccocus faecium, Vancomycin Resistant (VRE)	**9**	0					•	•		0	•		•	**18**	0	•	•	0	•	
Staphylococcus aureus	**416**		48				48	48	71	100	93	96	32	**60**	•	41	41	99	93	97
Methicillin Resistant *Staphylococcus aureus* (MRSA)	**215**		0				12	12	67	100	93	93	8	**26**		19	19	100	92	96
Methicillin Susceptible *Staphylococcus aureus*	**201**		100				83	84	76	100	93	99	58	**34**		58	58	97	94	97
Staphylococcus epidermidis	**100**		26				24	24	55	100	85	54	33	**82**		36	37	99	81	39
Staphylococcus lugdenensis	**11**		73				75	75	55	100	82	91	55	**6**		83	83	100	83	100
Streptococcus pneumoniae	**8**	100		63	100	100		100		100	75	75	75							
	BLOOD ISOLATES																			
Enteroccocus faecalis	**22**	100					•	•		100										
Enterococcus faecium	**4**	75					•	•		100										
Enterococcus faecium, Vancomycin Resistant (VRE)	**2**	0					•	•		0										
Staphylococcus aureus	**88**		50				48	48		100	90	91	35							
Methicillin Resistant *Staphylococcus aureus* (MRSA)	**43**		0				7	7	54	100	86	84	9							
Methicillin Susceptible *Staphylococcus aureus* (MSSA)	**45**		100				82	82	76	100	93	98	59							
Staphylococcus epidermidis	**28**		18				8	8	47	100	86	39	27							
Staphylococcus lugdenensis	**5**		100				100	100	80	100	80	100	80							
Streptococcus pneumoniae	**12**	100		70	100	100		100		100	75	83	59							

Numbers reflect the percent susceptible based on achievable blood levels of antimicrobials.

Exercise discretion when interpreting the susceptibility rates of organisms with <30 bacterial isolates.

Bolded numbers reflect a greater than or equal to 10% change in susceptibility relative to the prior year; **Blue = improved; Red= worsened.**

• not routinely reported not tested

(1) Amoxicillin tested on Strep. pneumo isolates

(2) 38% of Streptococcus pneumoniae isolates from non-urine sources, and 13% of blood isolates tested intermediate

(3) Isolates are tested for inducible clindamycin resistance

(4) Nitrofurantion is ineffective for the treatment of UTI in patients with CrCl less than 60 mL/min

Data obtained from Cerner Millennium and bioMérieux VITEK 2

Please contact the Antimicrobial Stewardship Program Pharmacist at 784-5387 with any questions.

2014 REX HEALTHCARE ANTIBIOGRAM

January-December 2013 Data

	OTHER SOURCES - NOT URINE or BLOOD															URINE ISOLATES												
	Beta Lactams									Aminoglycosides[1]			Quinolones		Sulfonamides													
	Penicillins				Cephalosporins				Penems																			
					1st gen	2nd gen	3rd gen	4th gen																				
Gram-Negative Organisms	**# Isolates**	Ampicillin	Ampicillin sulbactam	Piperacillin/tazobactam	Cefazolin	Cefoxitin	Ceftriaxone	Cefepime	Meropenem	Amikacin	Tobramycin	Gentamicin	Ciprofloxacin	Levofloxacin	TMP/SMX	**# Isolates**	Ampicillin	Ampicillin sulbactam	Piperacillin/tazobactam	Cefazolin	Ceftriaxone	Cefepime	Gentamicin [1]	Tobramycin [1]	Ciprofloxacin	Levofloxacin	TMP/SMX	Nitrofurantoin [2]
Acinetobacter baumanni	**7**	•	100	86	•	•	0	86	86	•	100	86	86	86	60	**3**	•	67	67	•	0	67	67	67	67	67	50	•
Citrobacter freundii	**3**	•	•	100	•	0	100	100	100	100	100	100	67	71	100	**25**	•	•	84	•	76	100	96	96	84	84	95	76
Enterobacter aerogenes	**13**	•	•	77	•	0	77	100	85	100	100	100	85	85	100	**24**	•	•	79	•	83	100	100	100	96	96	100	13
Enterobacter cloacae complex	**20**	•	•	65	•	0	86	100	95	100	100	100	93	95	80	**39**	•	•	78	•	80	98	93	95	83	83	80	25
Escherichia coli	**86**	48	58	95	95	84	100	100	100	100	92	88	76	76	85	**971**	52	60	96	95	98	100	93	94	75	75	76	91
E.scherichia coli ESBL	**12**	•	•	•	•	•	•	•	100	88	63	75	25	25	63	**58**	•	•	•	•	•	•	67	65	10	10	22	78
Klebsiella oxytoca	**7**	0	71	100	86	100	100	100	100	100	100	100	100	100	100	**27**	0	63	95	74	97	100	100	100	96	96	97	70
Klebsiella pneumoniae	**43**	0	88	93	98	93	100	100	100	100	100	100	95	95	98	**235**	0	90	97	98	99	99	98	97	95	96	93	30
Kleb pneumoniae ESBL	**6**	•	•	•	•	•	•	•	100	100	33	50	33	33	50	**16**	•	•	•	•	•	•	31	19	6	6	50	6
Proteus mirabilis	**29**	83	93	100	97	97	100	100	100	100	86	83	69	69	66	**107**	87	96	100	98	99	99	85	90	70	72	75	0
Pseudomonas aeruginosa	**69**	•	•	93	•	•	•	90	93	100	96	90	80	80	•	**82**	•	•	98	•	•	95	94	99	79	74	•	•
Serratia marcescens	**15**	•	•	•	0	47	93	93	100	100	86	93	86	87	82	**11**	•	•	•	0	91	100	100	100	91	91	100	0
Stenotroph. maltophilia	**13**													81	77	**5**										60	100	

BLOOD ISOLATES

Acinetobacter baumanni	**3**	•	100	100	•	•	0	100	100	•	100	100	100	100	100
Citrobacter freundii	**3**	•	•	100	•	•	100	100	100	100	100	100	100	100	100
Enterobacter cloacae complex	**7**	•	•	100	•	•	100	100	100	100	100	100	100	100	100
Escherichia coli	**70**	49	59	96	96	81	97	100	100	100	94	94	74	74	74
Escherichia coli ESBL	**3**	•	•	•	•	•	•	•	100	100	33	100	0	0	0
Klebsiella oxytoca	**2**	0	100	100	100	100	100	100	100	100	100	100	100	100	100
Klebsiella pneumoniae	**24**	0	96	96	100	96	100	100	100	100	100	100	100	100	96
Klebsiella pneumoniae ESBL	**1**	•	•	•	•	•	•	•	100	100	100	100	100	100	0
Proteus mirabilis	**7**	100	100	100	100	86	100	100	100	100	71	71	43	43	57
Pseudomonas aeruginosa	**12**	•	•	100	•	•	•	100	100	100	100	100	92	92	•
Serratia marcescens	**5**	•	•	•	0	0	60	100	100	100	80	100	60	60	60
Stenotroph. maltophilia	2													100	100

Numbers reflect % susceptible based on achievable blood levels of antimicrobials.

Exercise discretion when interpreting the susceptibility rates of organisms with <30 bacterial isolates.

Bolded numbers reflect greater than or equal to 10% change in susceptibility relative to the prior year; **Blue = improved**; **Red = worsened.**

• not routinely reported not tested

(1) Aminoglycoside cascade reporting rule: gentamicin result will be reported preferentially over tobramycin and amikacin, respectively.

(2) Nitrofurantion is ineffective for the treatment of UTI in patients with CrCl less than 60 mL/min.

Data obtained from Cerner Millennium and bioMérieux VITEK 2

Rex Healthcare Laboratory (919) 784-3040. Telephone extensions are: Pathologists' Direct Line (3063), Judy Allen (Clinical Laboratory Manager 2192), Stephen Finch (Laboratory Director 2400), Janet Johnson, (Anatomic Pathology Manager 3888), Kellie Newman (Suburban Diagnostic Services Manager 7018), Robin Wagner (Laboratory Outreach Manager 3136), Margaret Windett-Sims (Rex Blood Services Manager 4763). Client Response Center (919) 784-6000 (phone) (919) 784-6299 (fax)

Rex Hospital Outpatient Laboratory Hours of Operation

Rex Hospital (effective March 3)
Monday – Friday • 7 a.m. – 6 p.m.
Saturday 8 a.m. – 1 p.m.
Sunday 8 a.m. – 1 p.m.

Rex Medical Plaza & Garner
Monday – Friday • 8:30 a.m. – 5 p.m.

Cary & Wakefield
Monday – Friday • 7 a.m. – 5 p.m.
Saturday 9 a.m. – 1 p.m.

Knightdale & Holly Springs
Monday – Friday • 8:30 a.m. – 5 p.m.
Saturday 9 a.m. – 1 p.m.