Rex Laboratory BULLETIN

March 2013

UPDATES AND INFORMATION FROM REX PATHOLOGY LABORATORY

Issue Number 195

On the Lookout for Surfer's Ear

Exostosis of the external auditory canal (surfer's ear) is a benign reactive condition associated with cold water exposure of the ears. This condition usually presents as bilateral, multiple, pearly submucosal growths identified during otoscopic examination (figure 1). Osteomas are less common, rounded single bony ear lesion not associated with cold water.

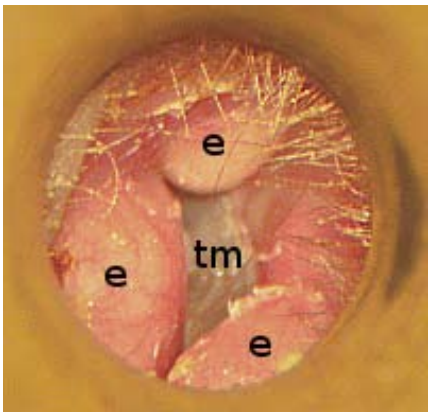

Figure 1: EAC with multiple exostoses (e) obstructing tympanic membrane (tm). ENT Kent.com

Exostoses of the external auditory canal (EAC) canal are believed to result from stimulation of the periosteum by exposure to cold temperatures. In the EAC the bone is very close to the surface with minimal insulation. Cold water can have a direct cooling effect and even warm water can lead to this condition through evaporative cooling in windy conditions. Several studies have even shown exostoses to be more prevalent in the ear facing prevailing winds of a region. Surfing is not the only activity linked to these bony growths as it can be seen in swimming, kayaking, sailing, jet skiing, diving or any other sport/occupation linked with water, wind, and cool temperatures. Physicians may note an increase in this finding related to the southern migration of patients to the Triangle region (see Cary). At Rex Pathology we have seen a few recent examples of surgical excision of these benign bony growths (figure 2). The issue was also raised personally when my primary care physician alerted me to about ten such masses in my ears.

Figure 2: Bony lesion from EAC removed at Rex

The initial presentation of exostoses of the EAC may be as a purely incidental finding on exam such as in my case. The condition can also lead to increased ear infections and hearing loss. Ear infections are directly related to physical obstruction of the EAC with accumulation of water and debris. Growth of exostoses is directly related to continued exposure to the inciting activity.

Treatment for EAC exostoses is usually conservative. Progression can be prevented by keeping the EAC warm, however the bone growth is irreversible. This may entail ear plugs, swim caps or neoprene hoods being worn in the water. If the condition reaches the point of EAC obstruction, surgery is an option, removing the bony growths by drill or chisel. This author hopes to avoid both drills and chisels and start wearing ear plugs and/or a neoprene hood in the ocean, further embarrassing wife and children. Special thanks to Dr. Matthew Gerber of Raleigh ENT for educating me on this topic.

Vincent Smith M.D.

References:

1. *Reddy, VM et al. Surfers awareness of the preventability of "surfer's ear" and use of water precautions. J Laryngol Otol 2011; 125(6) 551-3.*
2. *Wong, BJ et al. Prevalence of external auditory canal exostosis in surfers. Arch Otolaryngol Head Neck Surg 1999; 125(9):969-72.*
3. *Fairley JW. Swimmer's exostois (image) http://entkent.com/otitis-externa.php*

REX PATHOLOGY ASSOCIATES, P.A.

John D. Benson, M.D.	(919) 784-3059	Preeti H. Parekh, M.D.	(919) 784-3060
Timothy R. Carter, M.D.	(919) 784-3058	John P. Sorge, M.D.	(919) 784-3062
Keith V. Nance, M.D.	(919) 784-3286	Keith E. Volmar, M.D.	(919) 784-2506
F. Catrina Reading, M.D.	(919) 784-3255	Suzanne White, Pathology Service Specialist	(919) 612-7272
Vincent C. Smith, M.D.	(919) 784-3056	Rhonda Humphrey, Practice Manager	(919) 784-3063

REX UNC HEALTH CARE

Rex Healthcare Antibiogram Summary 2013
(organisms isolated during calendar year 2012)

Enclosed please find the results of the Rex Healthcare 2013 Cumulative Antibiogram. The findings are briefly summarized below.

Target pathogen trends (non-urines):

Vancomycin-resistant *E faecium* (VRE)
There was a slight uptick in the number of vancomycin-resistant *E faecium* relative to the whole (63.2% of non-urine isolates in 2012, compared to 53.8% in 2011). However, there were too few isolates to draw any meaningful conclusions regarding trends in susceptibility.

Oxacillin-resistant *S aureus* (ORSA, MRSA)
The number of resistant isolates remained stable at 54%.

Extended-spectrum beta-lactamase producing organisms (ESBLs)
There was a slight increase in number of ESBL-producing E coli and Klebsiella pneumonia relative to the whole (7.5% in 2012 compared to 5.6% in 2011). 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 46% percent fewer isolates seen in 2012 than in 2011 (15 versus 29, respectively). Because of the small number of isolates, it is difficult to draw any meaningful conclusions regarding susceptibility trends.

Pseudomonas aeruginosa
The total number of isolates remained stable for 2012 compared to 2011 (97 versus 107, respectively). There were no alarming susceptibility trends.

2013 REX HEALTHCARE ANTIBIOGRAM
January-December 2012 data

	NON-URINE SOURCES														URINE ISOLATES												
	Beta Lactams									Aminoglycosides [2]			Quinolones		Sulfonamides												
	Penicillins				Cephalosporins				Penems																		
					1st gen	2nd gen	3rd gen	4th gen																			
Gram-Negative Organisms	**# Isolates**	Ampicillin	Ampicillin sulbactam [1]	Piperacillin/tazobactam [1]	Cefazolin	Cefoxitin [1]	Ceftriaxone	Cefepime	Meropenem	Amikacin	Tobramycin	Gentamicin	Ciprofloxacin	Levofloxacin	TMP/SMX [3]	**# Isolates**	Ampicillin	Ampicillin sulbactam [1]	Piperacillin/tazobactam [1]	Cefazolin	Ceftriaxone	Cefepime	Tobramycin [2]	Gentamicin [2]	Ciprofloxacin	Levofloxacin	TMP/SMX [3]	Nitrofurantoin [4]
Acinetobacter baumanni	15	•	•	•	•	•	0	60	67		100	73	47	47	60	**0**	•	•	•	•	•	•	•	•	•	•	•	•
Citrobacter freundii	7	•	•	•	•	•	100	100	100	100	100	100	100	100	100	**18**	•	•	•	•	94	100	90	89	94	94	72	89
Citrobacter koseri (diversus)	5	•	•	•	•	•	100	100	100	100	100	100	100	100	100	**0**	•	•	•	•	•	•	•	•	•	•	•	•
Enterobacter aerogenes	12	•	•	•	•	•	92	100	100	100	100	100	100	100	100	**31**	•	•	•	•	81	97	100	100	90	94	100	6
Enterobacter cloacae complex	50	•	•	67	•	0	74	94	96	100	96	96	92	92	88	**32**	•	•	•	•	78	100	97	97	84	84	88	19
Escherichia coli	146	51	63	96	96	100	99	100	100	100	93	90	75	74	73	**975**	53	72	96	96	99	100	94	91	75	75	76	93
E.scherichia coli ESBL	13	•	•	•	•	•	•	•	100	100	38	54	15	15	23	**60**	•	•	•	•	•	•	75	83	5	5	33	76
Klebsiella oxytoca	16	0	•	•	88	•	94	94	94	100	100	100	88	94	94	**26**	0	•	•	81	100	100	96	96	96	96	96	54
Kleb pneumoniae	59	0	•	•	98	•	100	100	100	100	100	100	98	98	97	**251**	0	93	100	98	99	99	99	99	97	97	91	37
Kleb pneumoniae ESBL	5	•	•	•	•	•	•	•	100	100	80	80	40	40	60	**20**	•	•	•	•	•	•	50	65	20	20	50	5
Proteus mirabilis	49	88	•	•	94	•	96	96	100	100	98	92	76	78	86	**126**	86	100	100	88	89	89	95	95	78	78	87	0
Pseudomonas aeruginosa	97	•	•	79	•	•	•	87	82	99	96	86	72	63	•	**85**	•	•	92	•	•	88	96	89	71	67	•	•
Serratia marcescens	24	•	•	•	0	•	100	96	96	100	96	96	92	92	100	**8**	•	•	•	0	100	100	100	100	100	100	100	0
Stenotroph. maltophilia	14													86	100												
BLOOD ISOLATES *																												
Enterobacter cloacae complex	10	•	•	•	•	•	50	100	100	100	100	100	90	90	70													
Escherichia coli	66	55	80	100	97	100	100	100	100	100	99	94	82	80	67													
Escherichia coli ESBL	6	•	•	•	•	•	•	•	100	100	33	33	0	0	17													
Klebsiella pneumoniae	18	0	•	•	100	•	100	100	100	100	100	100	94	94	89													
Klebsiella pneumoniae ESBL	2	•	•	•	•	•	•	•	100	100	100	100	100	100	50													
Proteus mirabilis	11	82	•	•	82	•	91	91	100	100	100	91	64	64	82													
Pseudomonas aeruginosa	18	•	•	80	•	•	•	94	84	100	100	100	72	72	•													

*Not reported separately in prior years, no comparitive susceptibility data available.
Numbers reflect % susceptible based on acheivable blood levels of antimicrobials.
Bolded numbers reflect greater than or equal to 10% change in susceptibility relative to the prior year. **Blue = improved; Red = worsened.**
• not reportable, or not reported due to low number of isolates tested. not tested
(1) New panel implemented November 2012, these antibiotics were not on previous card and numbers may be too low to report.
(2) Aminoglycoside cascade reporting rule in effect October 2012. Gentamicin result will be reported preferentially over Tobramycin and Amikacin respectively.
(3) TMP/SMX a 50 % dose reduction is indicated for CrCl less than 30 mL/min; contraindicated for CrCl less than 15 mL/min.
(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

Enterobacter aerogenes and *E cloacae* complex

The number of isolates more than doubled in 2012 compared to 2011 (62 versus 29, respectively). *Enterobacter aerogenes* remained almost uniformly susceptible to all antibiotics tested, while there were very few losses in susceptibility for *E cloacae* complex.

Specific Drug Comments

Clinicians should note that fluoroquinolones performed very poorly against gram-positive organisms (both urines and non-urines), so these agents 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). Also of note, despite recent downward adjustment of susceptibility breakpoints for the carbapenem class, there were no significant losses in susceptibility to these agents for either *Pseudomonas aeruginosa* or the *Enterobacteriaceae*.

General Comments and Caveats

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.

Susan Tricas, M.(A.S.C.P.)
Vincent Smith, M.D.
Myra Hawkins, PharmD., B.C.P.S. (A.Q.-I.D.)

2013 REX HEALTHCARE ANTIBIOGRAM

January - December 2012 data

	NON-URINE SOURCES												URINE ISOLATES						
		Beta Lactams				Quinolones		Misc											
		Penicillins			Cephs														
Gram-Positive Organisms	# Isolates	Ampicillin(1)	Oxacillin	Penicillin(6),(7)	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(5)
Enterococcus faecalis	84	100					•	•	•	100	•		•	252	99	•	•	98	•	
Enterococcus faecalis , Vancomycin Resistant (VRE)	3	100	•				•	•	•	0	•		•	5	100	•	•	100	•	
Enterococcus faecium	7	43	•				•	•	•	100	•		•	15	47	•	•	0	•	
Enterococcus faecium , Vancomycin Resistant (VRE)	12	0	•				•	•	•	0	•		•	18	0	•	•	0	•	
Staphylococcus aureus	409	•	46				38	47	71	100	95	98	30	68	•	25	25	97	88	99
Methicillin Resistant *Staphylococcus aureus* (MRSA)	218	•	0				18	18	66	100	94	97	6	38	•	8	8	100	87	100
Methicillin Susceptible *Staphylococcus aureus*	191	•	100				79	79	77	100	96	98	58	30	•	47	47	94	90	97
Staphylococcus epidermidis	71	•	27				34	34	70	97	87	55	34	106	•	25	25	99	82	42
Staphylococcus lugdenensis	11	•	91				82	82	82	100	100	91	82							
Streptococcus agalactiae (Group B)(2)	122			100					70				47							
Streptococcus pneumoniae	27	96		78	100	100		100		100	96	89	80							
	BLOOD ISOLATES*																		
Enterococcus faecalis	20	100					•	•	•	100										
Staphylococcus aureus	89	•	47				43	43	64	100	94	99	31							
Methicillin Resistant *Staphylococcus aureus* (MRSA)	47	•	0				4	4	48	100	92	98	4							
Methicillin Susceptible *Staphylococcus aureus* (MSSA)	42	•	100				86	86	74	100	98	100	60							
Staphylococcus epidermidis	28	•	21				29	29	69	100	79	57	28							
Streptococcus pneumoniae	17	94		71	100	100		100		100	94	82	77							

*Not reported separately in prior years, no comparitive susceptibility data available.

Numbers reflect the percent susceptible based on acheivable blood levels of antimicrobials

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

[ ] not tested [•] not reported

(1) Amoxicillin tested on Strep. pneumo isolates

(2) Strep agalactiae includes both inpatient and outpatient data

(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

(5) TMP/SMX a 50 % dose reduction is indicated for CrCl less than 30 mL/min; contraindicated for CrCl less than 15 mL/min.

(6) 15 % of Streptococcus pneumoniae isolates from non-urine sources, and 24% of blood isolates tested intermediate

(7) Steptococcus agalactiae 100% suceptible based on no reported cases of resistance

Data obtained from Cerner Millennium and bioMérieux VITEK 2

Pro BNP to replace "old" BNP

Beginning April 2, 2013 Rex will discontinue BNP (brain natriuretic peptide) and replace it with Pro BNP. The test change is prompted by an ongoing reagent shortage on the Biosite Triage analyzer used for BNP. N-terminal pro-brain natriuretic peptide (Pro BNP) is measured in serum and plasma on the Siemens Dimension Vista® system. The new test allows for greater analyte stability (important for outreach testing), standardizes practice within the UNC Healthcare system, and decreases cost. Following the change, orders for "BNP" will be treated as orders for "Pro BNP".

BNP is a peptide secreted by the heart to regulate blood pressure and fluid balance. In the heart it is primarily secreted by the ventricles in the Pro BNP form. In response to ventricle volume expansion and/or pressure overload, Pro BNP is secreted. The N-terminal portion is then cleaved, producting two constituents, NT-proBNP (76 amino acids) and the active form, BNP (32 amino acids).

The test may be useful as an aid in the diagnosis and assessment of congestive heart failure. This test may also be used for risk stratification of patients with acute coronary syndrome and heart failure. Perhaps the greatest strength of Pro BNP is its negative predictive value for heart failure (reported up to 98%), making a normal result a useful rule out test.

It is important to note that the two tests are not interchangeable. While BNP and Pro BNP levels are similar in normal patients, Pro BNP is substantially higher than BNP in patients with cardiac disease. This is likely due to a combination of longer circulatory half-life of Pro BNP and differences in excretion. Importantly, Pro BNP is more affected by renal function. While both forms of BNP increase exponentially with increasing severity of chronic kidney disease, the effect is more pronounced for Pro BNP. ***Thus, there is a risk of overdiagnosing heart failure in patients with poor renal function.*** Heart failure, renal dysfunction and anemia are independent causes of elevated Pro BNP. Since all three can be inter-related and may present in combination in the cardiorenal anemia syndrome, intrepretation of elevations must be made with caution.

Reference Intervals: Interpretation of Pro BNP values requires knowledge of the patient's age, sex, and renal status. Based on the Siemens package insert, the test has the following diagnostic performance for heart failure:

< 75 years	(cutoff 125 pg/mL)	
	Male	Female
Sensitivity	94%	89%
Specificity	87%	92%

≥ 75 years	(cutoff 450 pg/mL)	
	Male	Female
Sensitivity	96%	88%
Specificity	73%	85%

Note that patients over 75 may have much higher levels of Pro BNP than those listed above, and some investigators have suggested an even higher cutoff value (900 pg/mL) in the absence of renal failure. Mild hemolysis and lipemia do not significantly affect Pro BNP values.

Pro BNP

Specimen type: Serum or plasma, random draw

Collection tube: Lithium heparin (green top tube) preferred; Red top and Gold top serum separator are acceptable.

Methodology: One-step sandwich chemiluminescent immunoassay

Reasons for Rejection: Gross hemolysis.

Analytical Measurement Range: 5 – 35,000 pg/mL

Cautions/Interferences: May be low when CHF is very acute, or when CHF occurs with ventricular inflow obstruction, and in obesity. The differential diagnosis of elevated Pro BNP is lengthy: CHF, left ventricular hypertrophy, valvular heart disease, atrial fibrillation, advancing age, myocarditis, acure coronary syndrome, pulmonary hypertension, congenital heart disease, anemia, pulmonary embolism, cardiac surgery, sleep apnea, critical illness, sepsis, burns, renal failure, and toxic-metabolic insults. Levels are not interchangeable with BNP.

Reference Intervals: Patient age and sex are required.

Biological Variation: Reports range from 10-30% within individual

Keith E. Volmar, M.D.

References:

1.Siemens Dimension Vista® System PBNP package insert.

2.Srisawasdi P, et al. The effect of renal dysfunction on BNP, NT-proBNP, and their ratio. Am J Clin Pathol. 2010;133:14-23.

3. Nilzuma S, et al. Impact of left ventricular end-diastolic wall stress on plasma B-type natriuretic peptide in heart failure with chronic kidney disease and end-stage renal disease. Clin Chem. 2009;55:1347-1353.

4.Tagore R, et al. Natriuretic peptides in chronic kidney disease. Clin J Am Soc Nephrol. 2008;3:1644-1651.

5. Hogenhuis J, et al. Anaemia and renal dysfunction are independently associated with BNP and Pro BNP levels in patients with heart failure. European Journal of Heart Failure. 2007;9:787-794.

6. deFilippi CR and Christenson RH. Editorial: B-type natriuretic peptide (BNP)/Pro BNPand renal function: Is the controversy over? Clin Chem. 2009;55:1271-1273.

7. Ricos C, et al. Current databases on biologic variation: pros, cons and progress. Scand J Clin Lab Invest. 1999;59:491-500. (the 2012 updated database is hosted on the Westgard site, www.westgard.com)

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
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.