pneumonia: *Acinetobacter baumannii* and *Haemophilus influenzae*, in the healthy population. Our objective was to determine how widespread antibody levels (as indicators of exposure) were to the lipopolysaccharides (LPS) of these two species. These were compared to antibody levels to the LPSs of *E. coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* of which we know more about antibody levels.
**Methods:** 475 serum samples from healthy donors were collected from the Southeast Scotland Blood Transfusion Service. These were used in ELISAs against LPS extracted by the aqueous phenol method from 8 strains of *A. baumannii*, 4 of *H. influenzae*, 2 of *E. coli*, 2 of *K. pneumoniae*, and 2 of *P. aeruginosa*.. All bacteria were isolated from patients with respiratory tract infections at the Royal Infirmary Edinburgh. The antibody levels to LPSs as determined by ELISAs were then compared between donors and the different species.
**Results:** The results indicated that antibody levels to LPS could be detected in all serum samples, ranging widely with the highest levels up to 5 times the median level. By regression analysis of scattergrams, comparing pairs of LPSs, antibodies to LPS from *A. baumannii* showed similar levels to *P. aeruginosa*, while those to *H. influenzae* showed antibody levels similar to those of *E. coli* and *K. pneumoniae* LPSs.
**Conclusions:** In the healthy population of SE Scotland it appears that healthy people are exposed to strains of *A. baumannii* at similar levels to their exposure to *P. aeruginosa*, and both species are found commonly in the environment. Similarly, exposure to *H. influenzae* was at similar levels to both *E. coli* and *K. pneumoniae* and all are common commensals. Pre-existing antibody levels specific to the LPS of these species could be directly related to susceptibility of patients to nosocomial pneumonia caused by the particular opportunist pathogen.

### P1677 Extended-spectrum β-lactamase producing Enterobacteriaceae in the faecal flora of Portuguese nursing home residents

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**Objectives:** Our previous work in community clinical isolates alerted us for the finding of extended-spectrum β-lactamase (ESBL) producers in particular niches, as nursing homes. In that way, the aim of our study was the detection and characterisation of ESBL producing Enterobacteriaceae in the faecal flora of nursing home residents, in Northern Portugal.
**Methods:** Faecal samples of nursing home residents from the North of Portugal were collected from January to July 2008. Samples were suspended in BHI. Isolates were selected in MacConkey agar with ceftazidime (2 mg/L), cefotaxima (2 mg/L), and aztreonam (2 mg/L). Lactose fermenters were randomly selected and susceptibility to antimicrobial agents was determined by agar diffusion methods according to the CLSI guidelines. Screening of ESBL producers was performed by the double disk synergy test and confirmed according to the CLSI. Identification of the selected strains was achieved by API 20 E. β-lactamases were characterised by isoelectric focusing. Conjugation assays were performed with *Escherichia coli* HB101.
**Results:** Of 184 faeces samples of residents in 6 nursing homes in the North of Portugal we screened 48 ESBL producing Enterobacteriaceae isolates: 39 *Escherichia coli*, 3 *Klebsiella pneumoniae*, 2 *Citrobacter freundii*, 2 *Enterobacter cloacae*, 1 *Enterobacter aerogenes* and 1 *Proteus mirabilis*, showing an ESBL of pI > 8 alone or in association with β-lactamases of pIs 5.4 and 7.4.
ESBL gene was successfully transferred coding a β-lactamase of pI > 8 alone or in combination with the other β-lactamases.
**Conclusion:** Our results showed that nursing homes are particular niches of community, acting as reservoirs of ESBL producing Enterobacteriaceae.
β-lactamase isoelectric points, alert for the hypothesis of one successful track of community dispersion of CTX-M-15, in different combination with other β-lactamases, as in the CTX-M-15 producing Portuguese ST131 *Escherichia coli* epidemic clone, that needs further research. This reality poses questions in terms of hospital admission of patients originating from nursing homes, relating to prevention of hospital dissemination of ESBL producers, colonising those patients. Also the inverse, spreading to nursing homes and community in general, from colonised elderly patients discharged from hospital when return to the ancient care facility or even to family home, might create a cycle of dissemination of ESBL producing Enterobacteriaceae and ESBL coding genes.

### P1678 The epidemiology of *Staphylococcus aureus* nasal and throat carriage in a large community-based population in northern Norway. The Tromsø Staph and Skin Study

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**Objective:** *Staphylococcus aureus* nasal carriage is associated with increased risk of bacteraemia and skin/soft tissue infections as well as atopic dermatitis. Studies suggest that the tonsils also may be a significant reservoir for the microbe. Our aim was to study the epidemiology of *S. aureus* nasal and throat colonisation and carriage in a large community-based population in North Norway.
**Methods:** A cross-sectional study was done as part of the sixth Tromsø Study in 2007–2008. Random samples of adult birth cohorts were invited to a health survey including clinical examinations, blood samples, and questionnaires on socio-demographic factors, lifestyle, health, chronic diseases and symptoms. The participation rate was about 66%. Nasal and throat swab cultures were performed in 3,996 participants for the assessment of *S. aureus* colonisation. A repeated set of cultures were performed in 2,986 participants for the assessment of *S. aureus* carriage (1,707 women and 1,279 men). Mean age was 54.5 years (range=30–87 years). Median length of the time interval between cultures was 28 days. All specimens were cultured within 24 hours on chromID *S. aureus* agar. Two carriage patterns for each site were distinguished: non-or-intermittent and persistent carriage.
**Results:** The prevalence of persistent *S. aureus* nasal and throat carriage were 25.1% and 6.0% respectively, and the results were almost constant across quartiles of the time interval between cultures (cut-off values: 18, 28 and 40 days). Considering culture results from both sites, 11.9% were defined as consistently persistent carriers, a minor group was single throat carriers (9.8%), and the majority was single nasal carriers (78.3%). Male sex was related to higher risk of nasal carriage (odds ratio, OR = 1.91; 95% confidence interval, 95% CI=1.61–2.27; adjusted for age). Age was negatively related to nasal carriage (OR = 0.91 per 10 years; 95% CI=0.85–0.98; adjusted for sex). *S. aureus* throat carriage was strongly related to nasal carriage (OR = 3.98 for nasal persistent carriage vs non-or-intermittent carriage; 95% CI=2.90–5.46; adjusted for sex and age).
**Conclusion:** The nasal vestibulum is the major niche for *S. aureus*. Age and sex are predictors for nasal *S. aureus* carriage. The role of other potential risk factors in *S. aureus* nasal and throat carriage is currently under investigation. This project brings prospects to studies of the host-microbe-environment triad in *S. aureus* carriage, infection, and skin disease.

## Virtuals and E-bugs: teaching microbiology

### P1679 e-Bug: evaluation of the e-Bug educational pack in England, France and the Czech Republic

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**Objectives:** To measure the effectiveness of the e-Bug pack in improving children's knowledge in 4 key areas – Introduction to Microbes, Transfer of Infection, Treatment of Infection and the Prevention of Infection, when used within the National Curriculum in England, France and the Czech Republic.
**Methods:** Teaching, using the e-Bug pack, was given by junior and senior school teachers.