Escherichia coli, a "symbiosis masquerade"

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Dear Editor,
Although the most commonly reported factors responsible for blood infection are Gram-positive bacteria associated with permanent vascular catheters, temporary vessel cannulation, or widely applied invasive procedures, Gram-negative pathogens are also frequently isolated in specimens from critically ill, or patients with an underlying disease (haematological malignancies, malignant solid tumors, pneumonia), or immunosuppressed patients, associated with urethra catheters, pressure ulcers and gastroenteritis [1-3]. Gram-negative *Escherichia coli* could cause nosological entities such as sepsis and haemolytic uremic syndrome in which various complications such as thrombotic episodes or even death could occur. The isolation of a pathogen from a patient's blood should trigger clinician's attention [4]. However, pathogen detection inside the bloodstream does not necessarily mean an infection or sepsis. In the case when the clinical features of infection are absent, a bacteraemia condition could be diagnosed. Is a long termed bacteraemia a symbiosis condition? A microbial symbiont is a microorganism that depends on a host for completion of at least a portion of its life cycle. Given this broad definition, symbionts may be helpful presenting mutualistic, or parasitic features towards their hosts. In some cases there is evidence that beneficial symbionts can evolve from harmful progenitors, and vice versa [5]. But is this always a well differentiated role? We present a 76-year-old male patient (Figure 1). During the latest days of October 2014, he arrived in the emergencies department of the Hellenic Reference Centre for Alzheimer Disease and Dementia Related Syndromes, Neurological Clinic Agios Georgios at Alykes Volos. He was classified as a moderate to severe dementia patient (MMSE 11, GCT 19) [6, 7], with clear evidence of malnutrition (low values for total proteins, and iron deficiency), and a pressure ulcer in the area of coccyx, presenting eating and gaiting disorders, wearing a disposable incontinence pant. A few days later, fever occurred, and an urine culture was positive for *Escherichia coli*. Ciprofloxacin was blindly administered waiting for an antibiogram to be completed. Partial sensitivity was demonstrated towards ciprofloxacin, while strong sensitivity was only demonstrated towards gentamicin. Individualized strategies should be based on antimicrobial sensitivity and gentamicin was then administered. Fever went up to 39.1 degrees before dropping after a 2 days period of hyperpyrexia, with the patient ameliorated after passing a short sepsis period. At the end of November, with the temperature in an average 37.2 degrees, the blood culture was also positive, forcing a decision for a combined ciprofloxacin-gentamicin treatment to be applied, presenting though poor results, leading eventually to the previous mono-antibiotic regime. Low grade fever, or normal temperature combined with chronic bacteraemia, resulted to the administration of a protective dosage for the urinary tract of a sulfamethoxazole and trimethoprim antibiotic. Low, or no fever at all, WBC 12.000-15.000, positive urine cultivations and bacteraemia were present for a time period of 2 consecutive years. Then, during November 2016, a second episode of sepsis appeared, threatening patient's life. The

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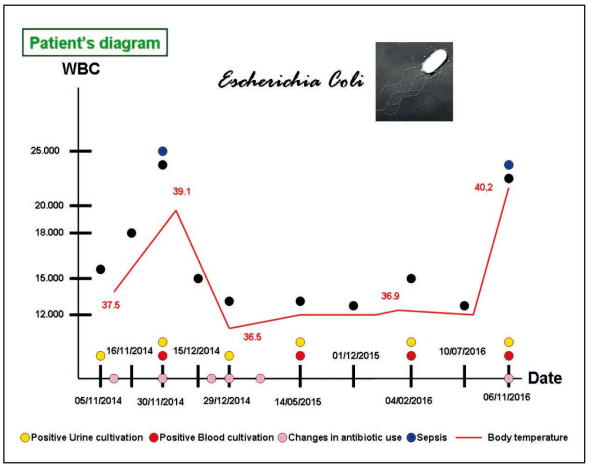

Figure 1 - Patient's diagram 2014-2016, Hellenic Reference Centre for Alzheimer Disease and Dementia Related Syndromes, Neurological Clinic Agios Georgios, Alykes Volos, Greece.

antibiogram once more demonstrated the same results of resistance and sensitivity. The application of gentamicin, improved patient's status, which returned to its previous condition after 6 days of treatment. Translocation of the *E. coli* was ambiguous. Did the bacteria traverse the perineum and successfully infected the urinary tract; did it infect the pressure ulcer moving into the blood's circulation; did it move directly into the urinary tract through the urethra due to bad hygiene of the area? These were the hypotheses that still remain unclear. The multiplicity of factors that may influence human's body and bacteria interactions makes an accurate assessment of such relationships difficult. An appraisal of this interaction in humans is even more tenuous, considering the many hereditary and acquired extra and intra-environmental changes that may profoundly alter host susceptibility, and/or response to a given parasite are considered. Additionally, not all pathogens, judged by bacteriologic and serologic methods of classification as similar possess the same biologic potential to cause disease. In other cases *E. coli* presented mechanisms of parasitism, frequent mutations to survive in an extra intestinal environment (urinary tract, blood), suicidal procedures when threatened by phages, and high rates of antibiotic resistance [2, 5, 8]. Our case demonstrated a 2 year "symbiosis", with no human acute response towards urine infection and bacteraemia. Sepsis appeared twice, at the starting point, and 2-years later, after the remission-symbiotic period. Is dementia under treatment an underlying disease that could cause immunosuppression? Can *E. coli* acquire a mechanism to suppress further defensive responses? Could it be mutated to survive in blood circulation under the human organism's "radar" during a "genetic masquerade"? We may only assume what a thorough genome study could testify.

Conflict of interest. The authors have no conflicts of interest to disclose.

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