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Letter to the Editor

The Possible Effects of IL-1β, IL-6 and TNF-α on Growth Rate in Two Different UPEC Strains

Fatma Kalaycı-Yüksek[1]*, Merve Bilgin[2], Gülşen Uz[3], Defne Gümüş[1], Mine Anğ-Küçüker[1]

[1]*Faculty of Medicine, Department of Medical Microbiology, Istanbul Yeni Yüzyıl University, Turkey*
[2]*Faculty of Pharmacy, Department of Pharmaceutical Microbiology, Istanbul Yeni Yüzyıl University, Turkey*
[3]*Faculty of Arts and Science, Department of Molecular Biology and Genetics, Istanbul Yeni Yüzyıl University, Turkey*

Host factors (hormones, indole, bile salts, vitamins) are known to affect bacterial growth rates, antibiotic susceptibility and various gene expressions (Plotkin *et al*., 2000; Hirakawa *et al*., 2005; Clark and Soory, 2006; Freestone *et al*., 2007; Hamner *et al*., 2013). During inflammation, cytokines as one of these host factors, act as leader of an orchestra to remove infection. Cytokines are involved in the systemic and local inflammatory response in patients with UTI (Meduri, 1996; Feghali and Wright, 1997). Tumor necrosis factor-α (TNF-α), interleukin-1β (IL-1β) and interleukin-6 (IL-6) are the most efficient pro-inflammatory cytokines in patients with urinary tract infections especially during pyelonephritis (Otto *et al,* 1999; Mohkam *et al*., 2009; Gokce *et al.*, 2010). In previous studies, it has been shown that the levels of these cytokines in blood and urine are significantly higher in patients with acute pyelonephritis compared to patients with lower UTI (Olszyna *et al*., 1998; Otto *et al*, 1999; Mohkam *et al*., 2009; Gokce *et al*., 2010). In our study, we aimed to investigate the effects of IL-1β, IL-6 and TNF-α on the growth rate of two different UPEC strains isolated from patients with cystitis and pyelonephritis.

Two UPEC strains carrying different genes (*cnf, sfa/foc, iroN, ompT, usp* and *sfa/foc, iroN, ompT, usp)* were tested to determine the alterations on growth rate. These strains were isolated in our previous study (Uzun *et al*., 2015).

Strains were grown in Roswell Park Memorial Institute Medium (RPMI) (control) and RPMI containing IL-1β, IL-6 and TNF-α (10, 100, 1000 and 10.000 pg/mL), which were determined according to their physiological and inflammation levels of blood in humans. We chose RPMI medium because it lacks the complex organic materials that are present in a conventional bacteriologic growth medium, and has no interference with the biologic activities of the tested cytokines (Umberto *et al*., 1999)

All strains were inoculated into 13 different experimental conditions to an initial turbidity of 10^7CFU/mL. Organisms were incubated at 37°C. Growth rates were determined by the measurement of changes in absorbance at 600 nm in 4, 6 and 24 –hour periods.

Each assay was performed in duplicate and the results were expressed as the mean of three independent experiments. Growth rates were determined via optical density measurement by a spectrophotometer. Statistical analysis was conducted by two-way ANOVA and Bonferroni post analysis.

Statistical analysis showed no significant difference ($p>0.05$) between the growth rates in RPMI and RPMI with different concentration of cytokines (Figure). Although some studies have reported that prokaryotic cells may use cytokines as growth factors, in our study no differences were detected in the growth of the two UPEC strains in the presence or absence of cytokines. Therefore, we thought that the alteration of growth rate in the presence of different host factors can be variable depending on the characteristics of the strain tested.

This graph shows the growth kinetics of a cystitis isolate with the presence of TNF-α, which shows that the growth rates were found to be statistically not significant. The same results were detected with the presence of IL-1β, IL-6 in a cystitis

* Corresponding author: e-mail: fatma.kalayci@yeniyuzyil.edu.tr

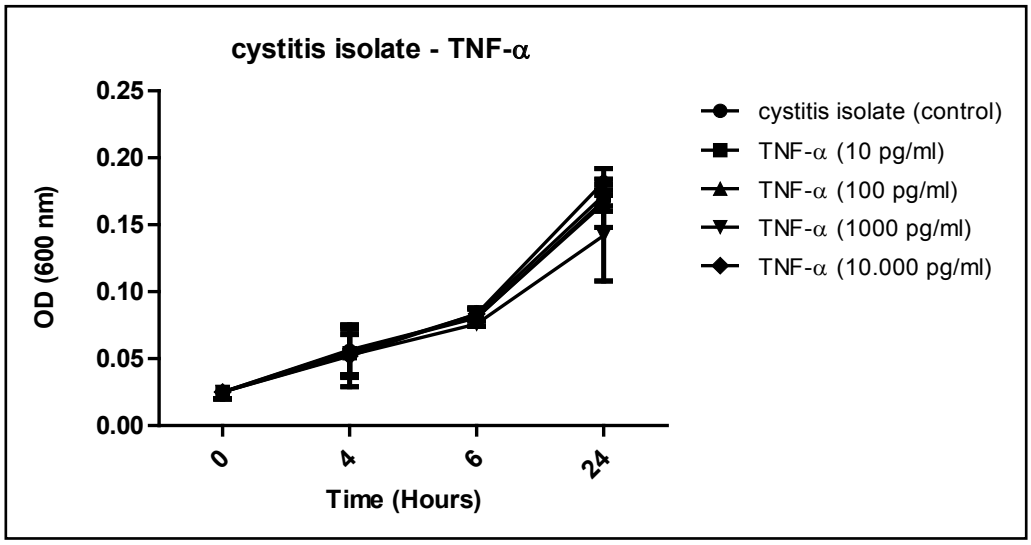

Fig. 1. Effect of different TNF- α concentrations on growth rate in cystitis isolate.

strain. The growth rates of a pyelonephritis strain treated with three different cytokines were found to be the same.

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