

A b s t r a c t

T i t l e	Effect of antibiotics on ammonia oxidation by activated sludge
A u t h o r	Sunao Yamamoto
A d v i s o r	Professor Taro Urase, Hirofumi Tutui
[summary] Antibiotics excreted from human after administration may disturb nitrification in the treatment of wastewater. This study focused on antimicrobials as toxic compounds, which possibly inhibit nitrification. The ammonia oxidizing bacteria used in this study was obtained from the activated sludge of the wastewater treatment plants in the university and Kitano municipal plant. An isolate culture (<i>Nitrosomonas europaea</i>) was also used for the comparison. The reaction rates of ammonia oxidation were measured with/without antibiotics (Levofloxacin (LVFX) and Clarithromycin (CAM)). The gene copy numbers and dissociation curve of the PCR products were measured by real-time PCR targeting <i>amoA</i> genes. The increasing inhibition on ammonia oxidation was observed by the addition of LVFX 5.0mg /L and CAM 1.0mg/L with time elapsed, followed by the complete inhibition after 7 days incubation. The same time-dependent effect was also confirmed in the case of Kitano sludge added stepwise with LVFX (0.125~1.0mg/L). However, <i>Nitrosomonas europaea</i> showed a clear gap in nitrification rate with the dose of LVFX at 1.0-2.0mg/L. When Kitano sludge was exposed to high concentrations of LVFX (2.0-8.0 mg/L), ammonia oxidation was resumed with time elapsed. A high ammonia oxidation activity was observed with the LVFX tolerant culture, which showed a different dissociation curve only at the same 87°C as <i>Nitrosomonas europaea</i> of <i>amoA</i> gene, while the original peak of the dissociation curve was found in the vicinity of 87°C and 91°C. We succeeded in the isolation of several LVFX-tolerant strains capable of ammonia oxidation from these activated sludge. These results indicated that the change in microbial consortia of the sludge, induced by the exposure to the antibiotics, would be essential for the continuation of the nitrification, because the consortia in the activated sludge consist of microorganisms with different sensitivities to the antibiotics.	

