Clin. Lab. 2025;71:1-3

ORIGINAL ARTICLE

Impact of Storage Conditions on the Stability of Urinary Biomarkers

Chanyuan Zhang [1, *], Tiebing Liu [2, *], Shanshan Xu [3], Lijiao Xia [1], Chunyang Zhu [1], Haiyuan Zhao [1], Guowei Jia [1], Hongjinwen Gao [1], Xuejing Wang [1]

[*] *Chanyuan Zhang and Tiebing Liu contributed equally to this work*
[1] *Department of Clinical Laboratory, Civil Aviation General Hospital (Peking University Civil Aviation School of Clinical Medicine), Beijing, China*
[2] *Civil Aviation Medicine Center, Civil Aviation Administration of China (Civil Aviation General Hospital), Beijing, China*
[3] *Department of Technical Service, Beijing Leadman Biochemistry Co., Ltd., Beijing, China*

SUMMARY

Background: **This study aimed to assess the influence of different storage conditions and pH levels on biomarkers in urine.**
Methods: **Urine samples were collected from 20 healthy individuals and 20 patients with kidney disease. The stability of nine proteins with normal and pathological concentrations was investigated under 4 types of storage conditions: 25°C for 8 hours, 4°C for 7 days, -20°C for 12 weeks, and -80°C for 12 months. Ten pH values (4.0 to 8.5) were also tested. Nine biomarkers included U-α1MG, U-Alb, U-Trf, U-IgG, U-NAG, U-NGAL, U-RBP, U-CysC, and U-TP, mostly measured in the laboratory.**
Results: **U-Alb, U-α1MG, U-Trf, U-TP, and U-CysC were relatively stable across four storage conditions. However, the stability of other biomarkers may be impacted by the storage conditions. For instance, U-IgG was unstable at -20°C after eight weeks and -80°C after one month. U-NAG was unstable at 4°C after four days and -20°C for 12 weeks. U-RBP was unstable at -80°C after five months and showed a significant upward trend at -20°C within 12 weeks in the pathological levels. Regarding the impact of the pH levels, the bias of U-α1MG and U-CysC did not exceed ± 10% across the pH range of 5.0 to 7.5. The bias of another 5 biomarkers (U-Alb, U-Trf, U-IgG, U-NGAL, and U-TP) was less than -10% at pH 5.0 to 6.0. U-NAG and U-RBP were unstable, with bias exceeding -10%.**
Conclusions: **U-NAG and U-RBP should not be stored at -20°C. U-IgG could only be stable for a short period under -20°C and -80°C. Urinary pH should be monitored and adjusted if necessary.**
(Clin. Lab. 2025;71:1-3. DOI: 10.7754/Clin.Lab.2024.240939)

Correspondence:
Prof. Xuejing Wang
Department of Clinical Laboratory
Civil Aviation General Hospital
(Peking University Civil Aviation School of Clinical Medicine)
Beijing
China
Email: wangxuejing@263.net

Manuscript accepted November 14, 2024

Supplementary Data

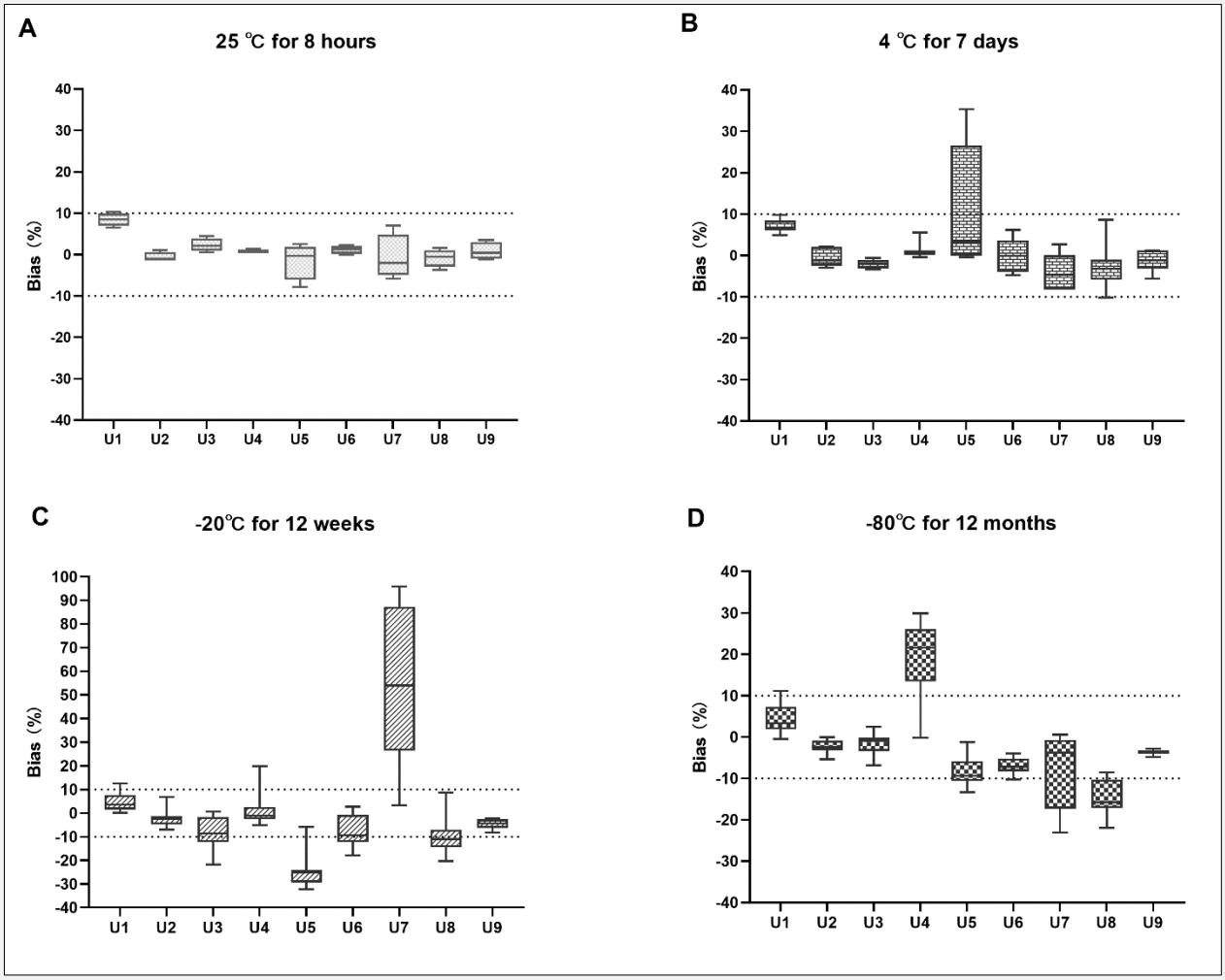

Figure S1. The bias of nine biomarkers in the pathological urine levels under four storage conditions.

Numbers 1 - 9 represent U-α1MG, U-Alb, U-Trf, U-IgG, U-NAG, U-NGAL, U-RBP, U-CysC, and U-TP. The dashed line shows a variation of ± 10%.

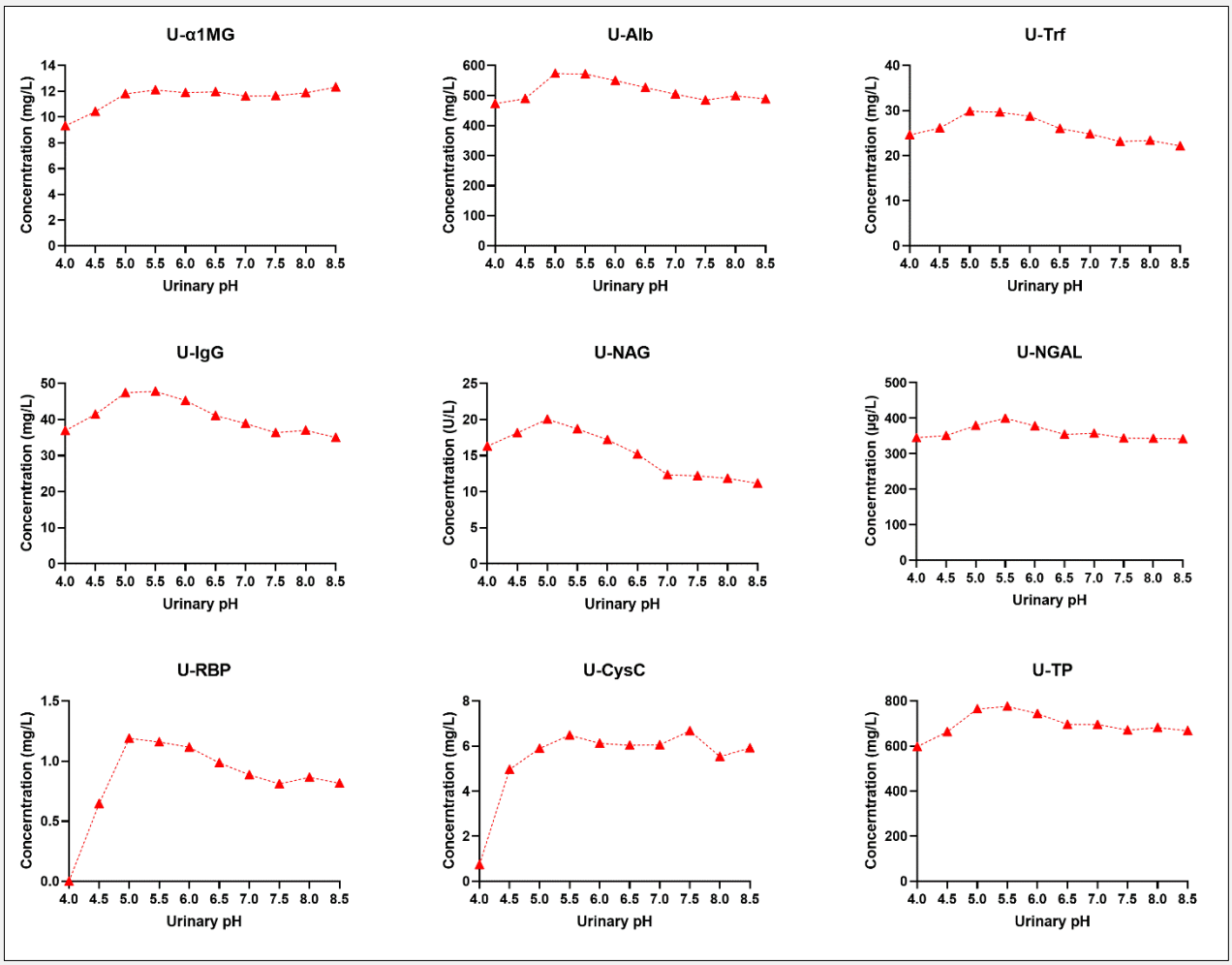

Figure S2. The concentrations of nine biomarkers in pathological-level urine across different pH levels.