INTERNATIONAL JOURNAL OF
MEDICAL BIOCHEMISTRY

DOI: 10.14744/ijmb.2025.96729
Int J Med Biochem 2025;8(2):155–156

Opinion Paper

Telemedicine in urinalysis: Future is now

Ozgur Aydin[1], Selcuk Sarikaya[2], Ramazan Ayas[3], Taner Ozgurtas[4]

[1]Department of Biochemistry Laboratory, Antalya Training and Research Hospital, Antalya, Türkiye
[2]Department of Urology, Gülhane Military Medical Academy, Ankara, Türkiye
[3]Sysmex Türkiye, İstanbul, Türkiye
[4]Department of Medical Biochemistry, Gülhane Military Medical Academy, Ankara, Türkiye

Abstract

Telemedicine is namely the practice of medicine using electronic and telecommunication technologies at a distance. Urinalysis may be the latest unit to meet automation in the Clinical Pathology Laboratory. Microscopic evaluation of urine samples has been a challenge for manufacturers in this field. We report an application of telemedicine in this field. Digital images taken by Sysmex UD-10 device built in a city were revised by a pathologist in another city.

Keywords: Healthcare, laboratory, telemedicine, urinalysis

How to cite this article: Aydin O, Sarikaya S, Ayas R, Ozgurtas T. Telemedicine in urinalysis: Future is now. Int J Med Biochem 2025;8(2):155–156.

Telemedicine is namely the practice of medicine using electronic and telecommunication technologies at a distance. As started with transforming information and images between telephones, the ultimate rise of the digital age has brought a plethora of applications. In hospitals, medical departments using digital imaging technologies, like radiology or surgical and clinical pathology, enjoy the comfort of sharing all sorts of data including real-time interactions. Compared to the surgical pathology, clinical pathology laboratory has been more convenient to automation. Accordingly, modern laboratories run to a future without any human interventions [1].

Urinalysis may be the latest unit to meet automation in the clinical pathology laboratory. Microscopic evaluation of urine samples has been a challenge for manufacturers in this field. Besides many articles reporting good correlation between instruments and manual microscopy, it should be considered as a field to be improved even in the most advanced systems. Meanwhile, automated urine analyzers have been accepted with exuberant welcome in laboratories as they are fast and precise. Particularly considering automated urine analyzers, it is not odd to call these instruments artificial intelligence: These machines "decide" on the nature of particles they "see" due to the characteristics of signal patterns [2]. As a state of wisdom, instruments classify particles "unknown" to them to be edited by human users. Actually, all instruments in the market need user editing to some degree that manual microscopy with a light microscope remain a compulsory component of the urine laboratory. New generation devices are equipped with adequate hardware components, so that developmental efforts on urinalysis automation focus mostly on software systems [3]. From the point of automation, hardware and software corresponds to human eye and neural system, respectively. The instruments using flow-cytometry or built-in microscopes have superior vision to human eye. However, a technician with average experience in urinalysis is still favored to the most advanced instrument. Obviously, superiority of the technician over the machine is due to the level of intelligence. On the other hand, as the instruments evolve, the need for human interference has decreased the capability of technicians in urinalysis. Education of the young ones is getting worse and as the experienced ones get retired, we observe a growing deficit of on-board editing of urine analyzers. An unusual crystal, for example, is reported undefined, unless consulted to an

Address for correspondence: Ozgur Aydin, MD. Department of Biochemistry Laboratory, Antalya Training and Research Hospital, Antalya, Türkiye
Phone: +90 543 235 76 29 **E-mail:** belozgur@hotmail.com **ORCID:** 0000-0002-6123-6186
Submitted: January 06, 2025 **Accepted:** February 03, 2025 **Available Online:** March 06, 2025

experienced supervisor. We have been using e-mail options for such consultations. We here describe a more efficient way of consultation that should be classified as telemedicine.

We have been dealing with the experimental parameter "atypical cells" in Sysmex UN automated urine analyzer for some time [3–5]. Our search aimed to evaluate the performance of the instrument in this parameter. In our latest study, a modular unit composed of Sysmex UF-5000 flow cytometry instrument and Sysmex UD-10 digital imaging instrument, was built in the laboratory [5]. While the counting of atypical cells by Sysmex UF-5000 was completely automated, digital images taken by Sysmex UD-10 had to be revised by a user [6]. Particularly, the evaluation of digital images by Sysmex UD-10 needed extra experience in this specific issue. In our study, while the instrument, the urologist ant other members of the study were located in one city (in Ankara), the expert pathologist to review the images of the Sysmex UD-10 unit joined the study from another city (Antalya). The pathologist was able to reach the instrument on-line and perform any action possible on-board. At the end of the day every patient had a report composed flow-cytometric analysis performed by the instrument located in Ankara and a decision comment performed by the pathologist located in Antalya.

We witness the rise of the artificial intelligence in all fields of life sciences and clinical pathology is no exception. It does not to be the most advanced applications; starting from the very beginning of laboratory information systems, we have been working with the artificial intelligence. Recents on-line applications like auto-verification of laboratory test results cause major changes in the management of modern laboratories [7]. 'Digital accessibility' brings many future aspects of laboratory medicine to date. We believe this particular experience has many applications that will influence the future aspects of telemedicine.

Authorship Contributions: Concept – O.A., R.A.; Design – O.A., R.A.; Supervision – T.O.; Funding – R.A.; Materials – R.A., S.S.; Data collection &/or processing – O.A.; Analysis and/or interpretation – O.A., T.O.; Literature search – O.A.; Writing – O.A.; Critical review – O.A., T.O.

Conflict of Interest: The authors declare that there is no conflict of interest.

Use of AI for Writing Assistance: No AI technologies utilized.

Financial Disclosure: The authors declared that this study has received no financial support.

Peer-review: Externally peer-reviewed.

References

1. Pallua JD, Brunner A, Zelger B, Schirmer M, Haybaeck J. The future of pathology is digital Pathol Res Pract 2020;216(9):153040. [CrossRef]
2. Aydin O. Atypical cells parameter in an automated urine analyzer: Does it have a future? Anal Biochem 2020;600:113763. [CrossRef]
3. Aydin O. Atypical cells parameter in Sysmex UN automated urine analyzer: Feedback from the field. Diagn Pathol 2021;16:1–5. [CrossRef]
4. Aydin O, Yapıcı O, Copuroglu R. Atypical cells in Sysmex UN automated urine particle analyzer: A case report and pitfalls for future studies. Turk J Biochem 2020;45(5):617–9. [CrossRef]
5. Aydin O, Sarikaya S, Caglar E, Ayas R, Ozgurtas T. Atypical cells parameter in Sysmex UN automated urine analyzer: A single center study. Turk J Biochem 2025;50(1):32–6. [CrossRef]
6. Aydin O. Sysmex UD-10 should accompany UF-5000 in managing atypical cells in urine. J Bioanal Methods Tech 2020;1(1):102.
7. Gul BU, Ozcan O, Dogan S, Arpaci A. Designing and validating an autoverification system of biochemical test results in Hatay Mustafa Kemal University, clinical laboratory. Biochemia Medica 2022;32(3):385–95. [CrossRef]