Editorial

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Done is better than perfect. Mark Elliot Zuckerberg

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Do you remember when cellular phone started popular? First several decades, it was banned to use in hospital because of the risk on malfunctioning medical devices. But nowadays, no one can survive without cellular phone or connection with web information through internet. Most of the health-care facilities now turn to allow the visitors to use cellular phones. Not only visitors but workers there also use them routinely to communicate each other, search for updated medical information, and for relaxing themselves.

Besides cellular phone as a connection device, starting from year 2000, cellular phone with camera has launched and received high reputations from users and first several years, developers spend a lot of times to install high quality camera on the phone. These days, quality of camera on those phones are high enough and it is a matter of fact for consumers that cellular phone has good quality camera and only few choose phones according to camera quality in Japan [1)].

In medical fields, automation devices development rapidly progressed and now artificial intelligence is coming into medical field as well. Those updated tools help the medical workers to save their labor and time as well as make their activities more accurate and rapid. It is needless to say that manual analysis of serum chemistry can not be done in medical facilities. The importance of accuracy is well accepted idea among us. In the field of camera, to reproduce realistic and consistent images from the real world, supreme color accuracy is required. Color accuracy is often assessed using standardized color charts. It is measured by quantifying the difference between the displayed colors and the reference colors. High accuracy can be achieved by several factors such as white balance and saturation the color gamut, sensor characteristics, lens quality, calibration. In the point view of human vision, visuality is very complexed and studied for long. In color perception, the human visual system features only three types of cones cells with their respective color pigments plus light-receptive rod cells for scotopic vision. In addition, it is the human brain that compensates for variations of light wavelengths and light sources in its perception of color. Metamers are pairs of different light spectra perceived as the same color by the human brain. Interestingly, colors that are interpreted as the same or similar by a human are sometimes readily distinguishable by other animals, most notably birds. Moreover, ageing has impact on visual perception. Aging results in the changes of the crystalline lens and cornea, and the pupil size. Advancing ages induces shorter wavelengths of visible light are absorbed, and blue hues appear darker. As a consequence, elderly individuals often experience difficulty discriminating between colors that differ primarily in their blue content, such as blue and gray or red and purple. Blood chemistry exams, we use devices to measure light wave length to quantify the measurements. However, in semiquantitative urinalysis by test-strip, we evaluate them by our eyes which is largely affected by the circumstances of examination room, examiners age as well as their experience. In the current issue, Inagaki and his colleagues reported [2)] a novel easy to access method to semi-quantify the color changes of urine test-strip by using cellular phone.

The technique itself is not new and some applications are already developed [3)], however, they require a deep learning which implies when insufficient data or false data are input to the device they will make false decision. Inagaki et al. developed a new method which does not require a deep learning and just measure the difference between the displayed colors and the reference colors which is often used for qualifying camera accuracy. As Mr. Zuckerberg pointed out, any new technique is not perfect but worth developing. Inagaki' s method is evaluated under strict condition of light condition and most of the examinations are reliable. Under those condition it can replace the human-based examination or large expensive machines, however, urine strip test is easy, safe and cost-effective screening test for health checks. It can be and should be done as a POCT at home. So far there remains three major issues to be clarified. One is that how quick the cellular phone returns the result. What is the TAT? Current machines and human observation require a few seconds to get the results. It may take few more minutes to record the results but in total, TAT is less than 2 minutes.

The second issue is the condition-dependency. As pointed out above, the current report used very strict condition with a special box to control lights but to use the method widely, the examination can be performed and achieve high quality under loose condition.

Finally, the data show that special gravity was not accurately evaluated neither by human visual exam nor Inagaki' s method. The color change does not match the sample 7 step colors in the test-strip is one possible reason and it would require to make more precise sample color chart (current widely use strip apply steps every 0.005)[4] or innovate the method to evaluate color differences. Furthermore test strip method has serious limitation in measurement of specific gravity. Test strip measures only cation by detecting changes of pH by urinary electrolytes such as Na, K and others those react with polyelectrolyte, phosphate buffer or metachromagy in methylene blue and dextran sulphate sodium. Therefore urinary strip does not react with non-electrolytes solute such as urea or creatinine and lower than the true gravity measured by refractometer which measures total solute. We should acknowledge the limitation of strip test in evaluation of specific gravity of urine.

Disclosure

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References

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