

УДК 378.018.43:378.147.091.33-027.22:611.018  
DOI: <https://doi.org/10.11603/mie.1996-1960.2022.3.13379>

## УДОСКОНАЛЕННЯ МОРФОЛОГІЧНОГО ПРАКТИЧНОГО ЗАНЯТТЯ В УМОВАХ ОНЛАЙН-НАВЧАННЯ

I. С. Попова

*Буковинський державний медичний університет*

Викладання морфологічних дисциплін в умовах дистанційного навчання несе за собою нові виклики для викладачів, адже макро- та мікропрепарати для таких предметів як гістологія, патологічна анатомія та патофізіологія є необхідними для розуміння базової організації органів на клітинному та тканинному рівнях, а також проявів патологічних змін. Не зважаючи на військовий стан у країні, якість надання освітніх послуг повинна залишатись на високому рівні, а, отже, практичні заняття онлайн не повинні поступатися своєю якістю та наповненням, що спонукає викладачів до пошуку та впровадження нових методів візуалізації навчального матеріалу. Дана робота спрямована на аналіз використання додаткових методів візуалізації для морфологічних дисциплін, що є альтернативою в умовах онлайн навчання. За умов функціонування університетської лабораторії з гістологічним відділом можливе використання класичних і спеціальних методів діагностики гістологічного матеріалу та впровадження цих методів у освітній процес. Запропоновано використання трансляційної відео системи для розбору клінічних випадків зі студентами протягом практичного заняття онлайн. Із метою повторення, узагальнення та закріплення пройденого матеріалу з конкретного блоку тем пропонується демонстрація біопсійного матеріалу обраного клінічного випадку (за умови отримання письмової згоди пацієнта на використання матеріалу без оприлюднення особистої інформації). Матеріал демонструється в режимі онлайн синхронно з мікроскопа викладача на різних збільшеннях, що дозволяє студентам ознайомитись із структурою тканини та вмістом клітин. Протягом дискусії студенти використовують знання, отримані на даній та суміжних дисциплінах, спираючись на розуміння даних гістологічного матеріалу.

Отже, теоретичні знання, отримані протягом перших курсів навчання знаходять своє пряме практичне застосування у вирішенні клінічного кейсу, розширюється здатність гістологічного диференціювання та діагностування біопсійних матеріалів. Також такий вид практичних вправ не залишає місця для академічної недоброчесності та розвиває навички клінічного мислення у студентів.

**Ключові слова:** гістологія, онлайн навчання, дистанційна освіта, біопсійний матеріал, методи візуалізації.

## IMPROVING MORPHOLOGICAL PRACTICAL CLASSES AT THE TERMS OF ONLINE EDUCATION

I. S. Popova

*Bukovinian State Medical University*

**Background.** Conducting practical classes of morphological disciplines online is challenging for academic tutors, as visual material like micro- and macro specimens are an essential part of mastering these subjects and understanding tissue organization on different levels. Despite the ongoing war, we believe that the quality of the educational process should remain high, that is why the content and standards for online classes should be qualitative as well. This prompts tutors to search and implement new visual tools for online classes as an alternative for classical offline activities. The aim of this work is to analyze additional visual tools for morphological classes online.

**Material and methods. Results.** Thanks to the scientific university laboratory we have an opportunity to train skills for common and special methods in morphology. We propose to use the visual video system for broadcasting real-patient cases to students live during practical classes online. Tutor picks up a clinical case with biopsy material (in case of a signed informed agreement on usage of patient's samples) that will help to summarize and revise covered topics of a specific block within the semester; there are no databases with answers available to students. Histological material is broadcasted live from the microscope of a tutor and explored on different magnifications. Discussion during the class, based on information obtained from the broadcasted image leads to diagnosis establishment.

**Conclusions.** Such types of activities help to implement theoretical knowledge from first courses directly into solving clinical cases live during the webinar; and to develop clinical thinking skills in a fair way, leaving no space for academic misconduct.

**Keywords:** histology, online classes, distance education, biopsy material, visualization methods.

**Introduction.** Mastering fundamental morphological disciplines like Pathology, Pathophysiology and Histology by medical students and interns is impossible without visual materials like histological slides, macro specimens, electronic microphotography [1]. Understanding basic composition of tissues and cells of the human organism is crucial for managing pathophysiological and pathological pathways of organs' dysfunction [2]. At the times of pandemic and especially nowadays when Ukraine is defending its borders during war, the question of providing qualitative skills while educating online remains controversial. Inspired by experience proposed by many medical institutions worldwide, showing the effectiveness of virtual microscopy tools [3-5] we have redesigned practical classes in order to fit nowadays demands of online education. In conditions where higher educational establishments conduct mixed or online studies and do not have the opportunity to have classical offline work with a light microscope and histological slides, we propose possible alternatives that can be used for mastering histological skills in diagnosing specimens online in academic groups of first and second courses.

The **aim of the work** is to propose implementation of additional visual exercises for morphological classes that are conducted online.

**Material and methods. Results.** At the times of pandemic are and nowadays with forced switch to distance education it is important to maintain high-quality educational process on one hand and beware of academic misconduct on the other. Moreover, when it comes to flexible schedules because of air sirens or active military actions in the region where members of the educational process are located, it is also crucial to have a good revision of the previously covered material and summarizing key points when it comes to this opportunity. It seems to be easy in the case of theoretical subjects, but when it comes to actual work with a group of 10-13 medical students, reaching each member of the group and assessing their knowledge turns out to be quite challenging.

Talking about morphological disciplines like "Histology, Cytology and Embryology", "Pathology" and "Forensic Medicine" it becomes obvious that histological specimens and macro specimens are the essential basis for fluent understanding of these subjects, but at the terms of forced or planned distance education these classical face-to-face activities with tissue material must be substituted and adapted. Besides materials that are commonly used, like

electronic versions of histological specimens (with or without labelings), illustrative diagrams and tables, electronic microphotographs, tutors oftenly thrive to diversify practical classes with demonstrable data. It works especially for topics that can be easily used in day-by-day clinical practice of a pathologist, histologist or forensic medicine doctor.

The Scientific and Educational Laboratory of Bukovinian State Medical University holds a Department of Clinical Histology, that is diagnosing post-surgical, oncological and scientific tissue material obtained from clinics or from scientific research of scientists. The Laboratory is a place for practical work of doctors-pathologists from departments of the university, as well as an educational process. For example, in terms of offline studies, students of the medical faculties practice in histological specimens' preparation (fixation, dehydration, creation of paraffin blocks, staining etc.) and students of lab diagnostics courses conduct actual biochemical blood analysis. Besides standard histological investigation, we conduct immunohistochemical (IHC) methods for tumor differentiation. This is one of the special methods in Histology that we aim to get implemented in practical classes as well.

Microscopes are equipped with video systems and applications that allow us to get high-quality images, taken from the slides. For example, "Zen" imaging system from "Zeiss" is a synchronic microscopic visualization program that is magnifying and broadcasting an image that is obtained from the microscope. Basically, doctors use this equipment for archiving digital photos of histological material or requesting consultations with other specialists. Moreover, it turns out to be a useful tool for pathologists of the laboratory who are educating students: it allows magnifying cells of the sample, examining the general composition of material on various magnifications – all synchronically on the screen that can be easily shared. As practical webinars in our university are held on the "Google Meet" site, broadcasting the image from the microscope while examining it in real time is easy and quick. Students who are present at the webinar do investigate the tissue on different levels of magnification synchronically as the tutor is working with the microscope. At last, it allows taking digital photos of samples for digital sharing with students.

In the focus of distance education, we propose to use this as a tool for discussing topical clinical cases with students in a real-time regime. We propose to select

real clinical cases (in case of signed agreement with patients on usage of histological material without any personal data promulgation, for educational purposes strictly) depending on the covered topics and use images without previously made markerings, so the students could figure out key changes or regions in samples on their own. Any platform that is used for the webinar should allow broadcasting a high-quality image synchronically that sometimes demands a high-speed internet connection. This is important for exploring material on high-magnification levels and observing cytoplasmic content of cells. It is also helpful to follow tutor's directions while discovering a broadcasted image from a thematic clinical case, especially for the first-course students.

As a result, during one of scheduled classes an academic group is informed about a clinical case task waiting for them. There are no open databases with cases, as these come from real-cases of the laboratory and don't leave an opportunity for academic misconduct during case analysis. During class, tutor uses a previously picked histological case, provides anamnesis information about a patient and demonstrates histological slides (hematoxylin and eosin, IHC basically) synchronically by the means of broadcasting video system whilst he is working with the microscope. Students discuss visual architecture of the tissues, possible changes that are seen and reasons for their occurrence. Discussion should be accompanied by actual glues, seen on the biopsy material. Finding the solution is not always quick or easy but is always demanding knowledge from other disciplines. It is valuable to develop clinical thinking skills whilst analyzing all data obtained from the case (provided by the patient's doctor and seen in the biopsy) and coming up with a diagnosis solution, based on a group discussion. The fact that it is a real-patient case stimulates students to be reasonable and responsible in their results.

We do believe that such type of activity gives students a broader understanding of tissue organization, if compared to the usage of a fixed photo of a slide,

### Література.

1. Evaluation of multidisciplinary strategies and traditional approaches in teaching pathology in medical students / Gopalan V., Kasem K., Pillai S., Olveda D., Ariana A., Leung M., Lam A. K. // *Pathology International*. – 2018. – № 68 (8). – P. 459-466.

that cannot be magnified to a higher degree for cellular content examination and is not connected to a clinical case. The cons of this tool are the complicacy of clinical cases used, especially for the first-grade students. Finding a proper demonstrative material for the first-grade academic groups can be challenging. In this situation one can use biopsy materials without pathological changes (from scientific experiments) that still expands their visual approach in differentiating histological material. On the other hand, solving clinical cases with a good quality visual representation of biopsy material involves interdisciplinary integration that leads to developing proper clinical thinking skills. Worth mentioning soft skills that are practiced during discussion: advocacy of one's points, open and fair competition, respect for opposite points of view. Another advantage is that we do predict possible ways of academic misconduct and can avoid it by picking new cases for different academic groups, leaving a space for open discussion and not providing a database of cases with solutions. In such a way students are challenged in using their own knowledge without unfair actions and receiving an award for their efforts in solving a case in a fair and clear way.

**Conclusions.** In conclusion, our experience of implementing visual interactive activities like live broadcasting of real biopsy cases during practical webinars on morphological disciplines (Histology and Cytology, Pathology) shows to be a helpful tool for developing clinical thinking in first-courses for medical students. Practical work in solving such cases, based on histological image diagnostics, emphasizes the importance of fundamental theoretical knowledge and develops clinical and interpersonal skills during discussion and solving of proposed material. As an outcome, students implement their knowledge, gained through their first two years of theoretical studies, in a real-case biopsy situation and appraise the quality of their own skills in a fair way.

2. Change in Pathology Medical Education: The Time Is Now / Bean S. M. // *Archives of Pathology & Laboratory Medicine*. – 2021. – № 145 (9). – P. 1069-1070.

3. The impact of site-specific digital histology signatures on deep learning model accuracy and bias / Howard F. M., Dolezal J., Kochanny S., Schulte J.,

Chen H. et al. // Nature communications. – 2021. – № 12 (1). – P. 1-13.

4. Teaching histology and anatomy online during the COVID-19 pandemic / Saverino D., Marcenaro E., Zarccone, D. // Clinical Anatomy. – 2022. – № 35 (1). – P. 129-134.

#### References.

1. Gopalan, V., Kasem, K., Pillai, S., Olveda, D., Ariana, A., Leung, M., Lam, A.K. (2018). Evaluation of multidisciplinary strategies and traditional approaches in teaching pathology in medical students. Pathology International. 68(8), 459-466.

2. Bean, S. M. (2021). Change in Pathology Medical Education: The Time Is Now. Archives of Pathology & Laboratory Medicine. 145(9), 1069-1070.

3. Howard, F. M., Dolezal, J., Kochanny, S., Schulte, J., Chen, H. et al. (2021). The impact of site-specific digital histology signatures on deep learning model accuracy and bias. Nature communications. 12(1), 1-13.

5. Successful use of Virtual Microscopy in the assessment of practical histology during pandemic COVID-19: A Descriptive Study / Amer M. G., Nemenqani D. M. // Journal of Microscopy and Ultrastructure. – 2020. – № 8 (4). – P. 156.

4. Saverino, D., Marcenaro, E., Zarccone, D. (2022). Teaching histology and anatomy online during the COVID-19 pandemic. Clinical Anatomy. 35(1), 129-134.

5. Amer, M. G., Nemenqani, D. M. (2020). Successful use of Virtual Microscopy in the assessment of practical histology during pandemic COVID-19: A Descriptive Study. Journal of Microscopy and Ultrastructure. 8(4), 156.

#### ORCID:

Iryna S. Popova: 0000-0003-1234-3855