

## Web-based remote diagnosis system using virtual slide for routine pathology slides, analysis of discrepancies between virtual and real microscopic diagnosis.

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**Abstract.** *Introduction:* Together with recent development of digital pathology technology, virtual slide (VS) primary diagnosis is becoming a real issue. On the other hand, there are objection or argument to VS primary diagnosis. To clarify the issues of VS primary diagnosis, we made comparison experiment between virtual and real microscope diagnosis.

*Methods:* To cover the insufficiency of pathologist in Japanese rural area, we constructed web-based remote diagnosis system using VS for routine biopsy specimens. We already made more than 2,000 primary pathology diagnosis for these 2 years. In the course of this VS remote diagnosis process, we encountered some difficult to diagnose cases. Using these cases, we try to find out what was difficult. Then, to investigate whether these difficulty causes VS itself, we tried comparison experiment. We picked up 119 biopsy cases that include 154 specimens from one year before pathology files, scan them to VS, and try to make VS primary diagnosis by 2 pathologists independently.

*Results:* There are 40 out of 2,000 VS remote diagnosis cases I asked to my partner pathologist to review under real microscope. The most common (14/40) were suspicious of malignant lymphoma cases. Among them, 10/14 were GI-tract endoscopic biopsy with suspicion of MALT lymphoma. Definite diagnosis of MALT lymphoma by HE-stained slide is usually difficult even under real microscope. Furthermore, the partner pathologist is good for the area of malignant lymphoma, and even not telepathology environment, I usually ask him suggestion. The other cases are all less than 4/40. Cases include atypical cells in breast needle biopsy, grade of colon adenoma, grade of uterine cervical CIN, etc. In the comparison experiment, there is no misdiagnosis between benign and malignant. We found 14/154 minor discrepancies. Again, there are discrepancies between the grade of colon tubular adenoma, grade of uterine cervical CIN, interpretation of atypical breast ductal papillary lesion, etc. There are 2 cases that 2 pathologists made same diagnosis by VS which were different from the original diagnosis, the real virtual and real microscope discrepancy. Both are the 1 grade discrepancy of CIN. This time, VS diagnoses were both 1 grade higher than real microscope diagnosis. Two cases are too few to discuss the tendency. On the other hand, there were 7 inter observer variation and 5 intra observer variation.

*Conclusions:* In conclusion, VS showed good enough quality to make primary diagnosis. There are more discrepancies between pathologists than virtual and real micro-scope. When comparing virtual and real microscope diagnosis, it is important to pay attention to inter and intra observer variation.

**Keywords:** virtual slide primary diagnosis, inter observer variation, intra observer variation.