

## BACKGROUND

- Pre-clinical medical school curricula consists of learning normal tissue structure (histology) and abnormal tissue structure (pathology).
- Integration of pathology topics into histology lectures has been implemented in individual organ system instruction at various medical schools.
- Presenting pathology topics with histology may allow students to make direct connections between normal tissue appearance and pathological tissue appearance.
- 44-52% of Step 1 tested content comes from pathology. Introducing pathology content during the histology course, prior to formal pathology instruction, will promote spaced repetition learning.
- Spaced repetition has been shown to promote student learning and long-term retention.
- The aim of this study was to see if integration of pathology content in to histology lectures would facilitate the subjective student experience in histology and improve academic outcomes in histology and pathology education.

## MATERIALS & METHODS

- USMLE Content Outlines were used to determine high-yield pathology topics for integration into histology lectures.
- 2-4 pathology topics per each organ system were selected and PowerPoint slides were developed and incorporated into histology lectures.
- Students from the Class of 2023 and 2024 were surveyed regarding their perceptions about the utility and perceived enhancement of learning from this integration.

Discipline	Range, %*
Behavioral Sciences	8-13
Biochemistry & Nutrition	14-24
Genetics	5-9
Gross Anatomy & Embryology	11-15
Histology & Cell Biology	8-13
Immunology	6-11
Microbiology	10-15
Pathology	44-52
Pharmacology	15-22
Physiology	25-35

\*Percentages are subject to change at any time. See the USMLE website ([www.usmle.org](http://www.usmle.org)) for the most up-to-date information.  
([www.usmle.org/pdfs/step-1/content\\_step1.pdf](https://www.usmle.org/pdfs/step-1/content_step1.pdf) & <https://www.usmle.org/step-1/#content-outlines>)

Table 1: Step 1 Test Content System Specifications\*

System	Range, %*
General Principles**	12-16
Behavioral Health & Nervous Systems/Special Senses	9-13
Reproductive & Endocrine Systems	9-13
Respiratory & Renal/Urinary Systems	9-13
Blood & Lymphoreticular/Immune Systems	7-11
Multisystem Processes & Disorders	6-10
Cardiovascular System	5-9
Musculoskeletal, Skin & Subcutaneous Tissue	6-10
Gastrointestinal System	5-9
Biostatistics & Epidemiology/Population Health	4-6
Social Sciences: Communication and Interpersonal Skills	6-9

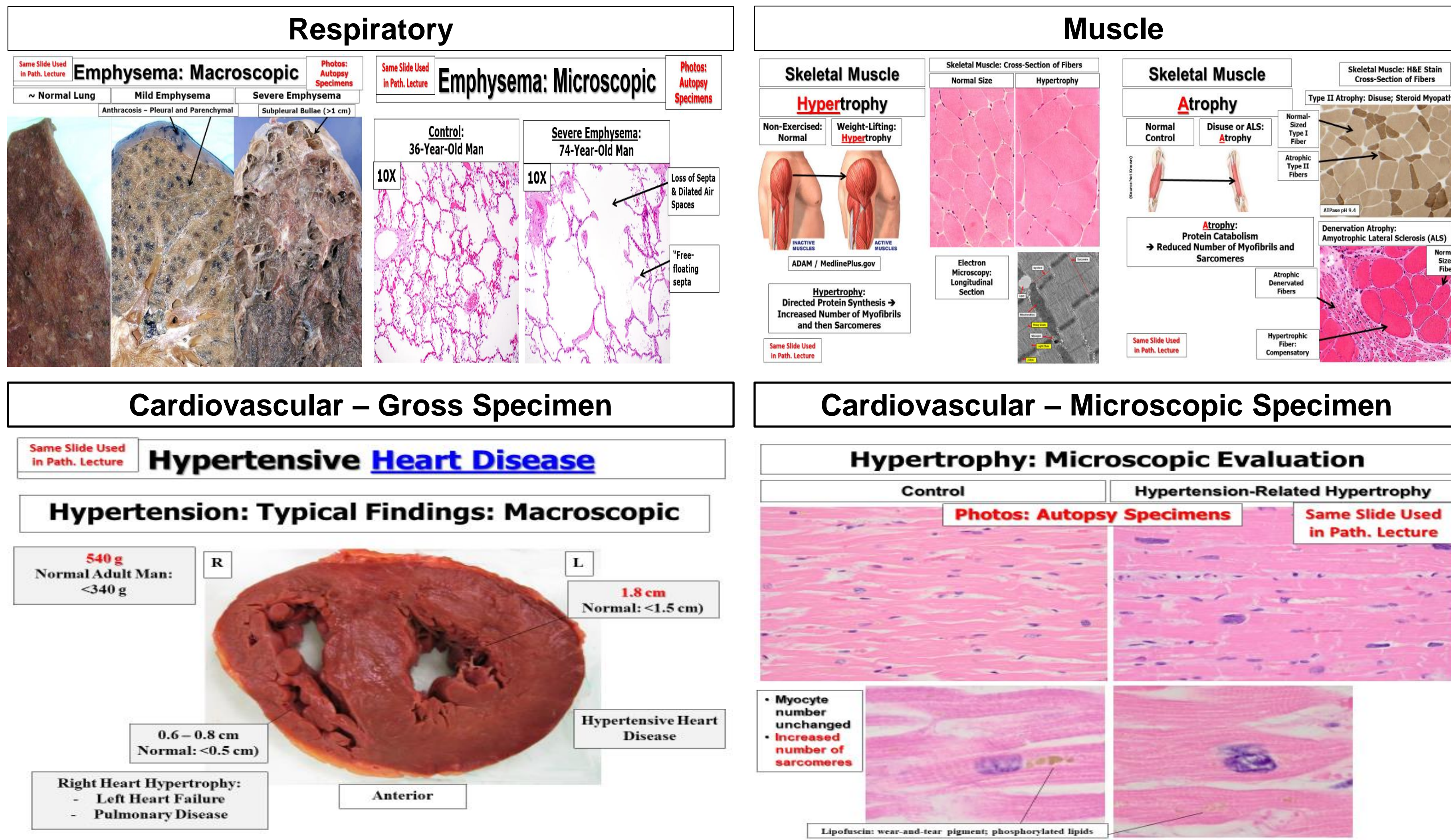
\* Percentages are subject to change at any time. See the USMLE website ([www.usmle.org](http://www.usmle.org)) for the most up-to-date information.

\*\* The Step 1 General Principles category includes normal and abnormal processes that are not limited to specific organ systems.

([www.usmle.org/pdfs/step-1/content\\_step1.pdf](https://www.usmle.org/pdfs/step-1/content_step1.pdf))

## RESULTS

Figure 1. Macroscopic and microscopic lecture material included during pulmonary lecture.



## Survey Results

Figure 2. Did students notice the integration?

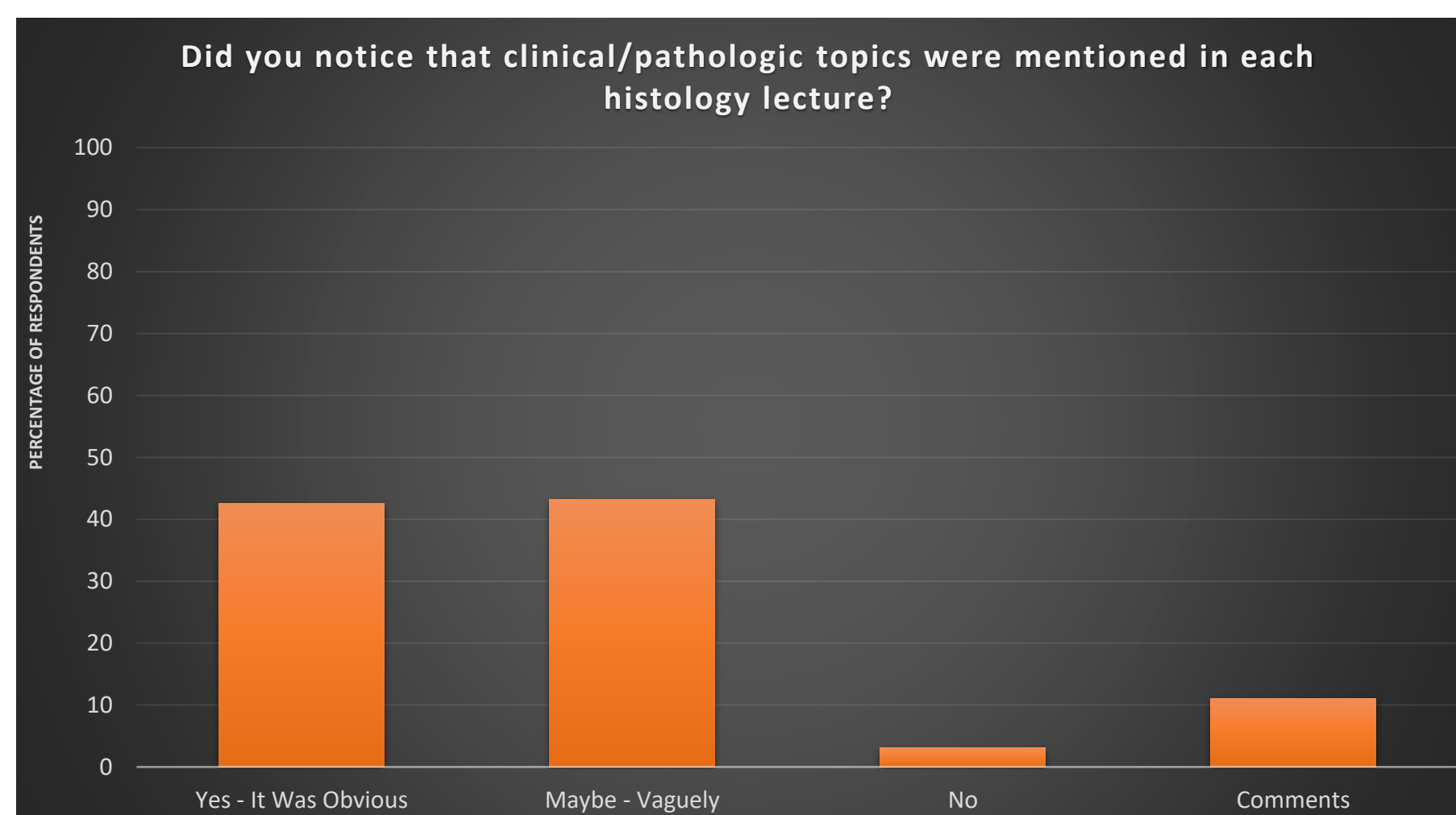


Figure 4. Perspectives about quantity of pathology material

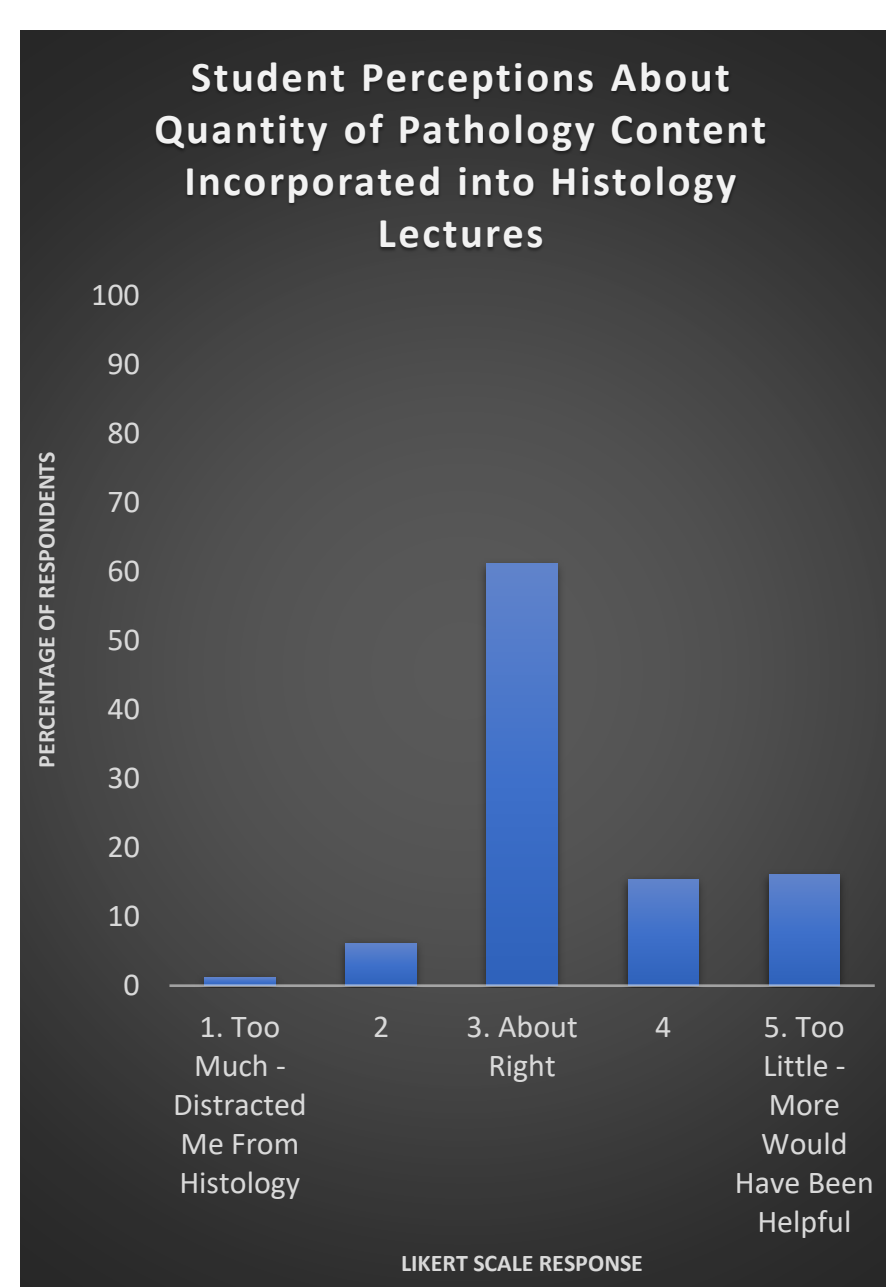


Figure 5. Recommendations for future pathology integration

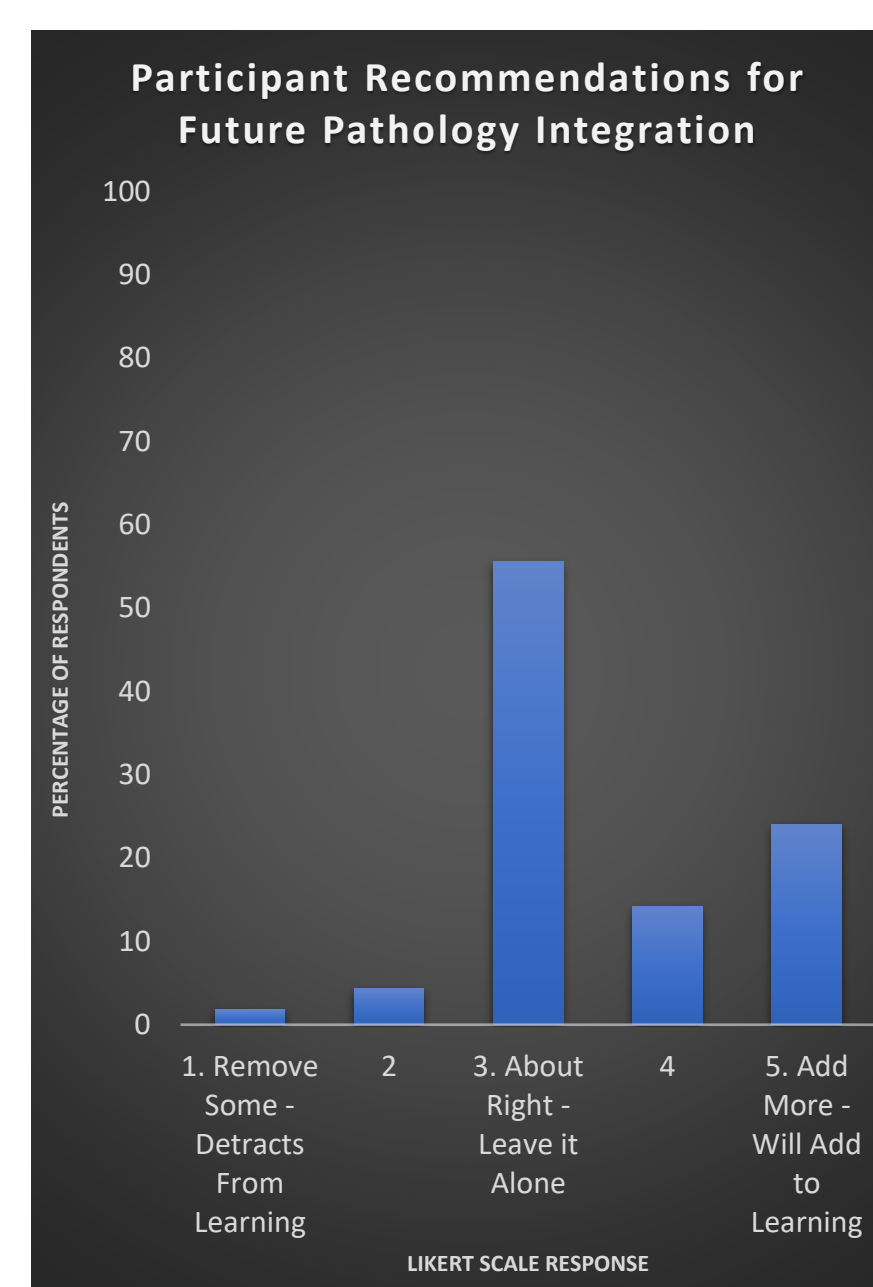


Figure 3. Was the addition of topics helpful to student learning?

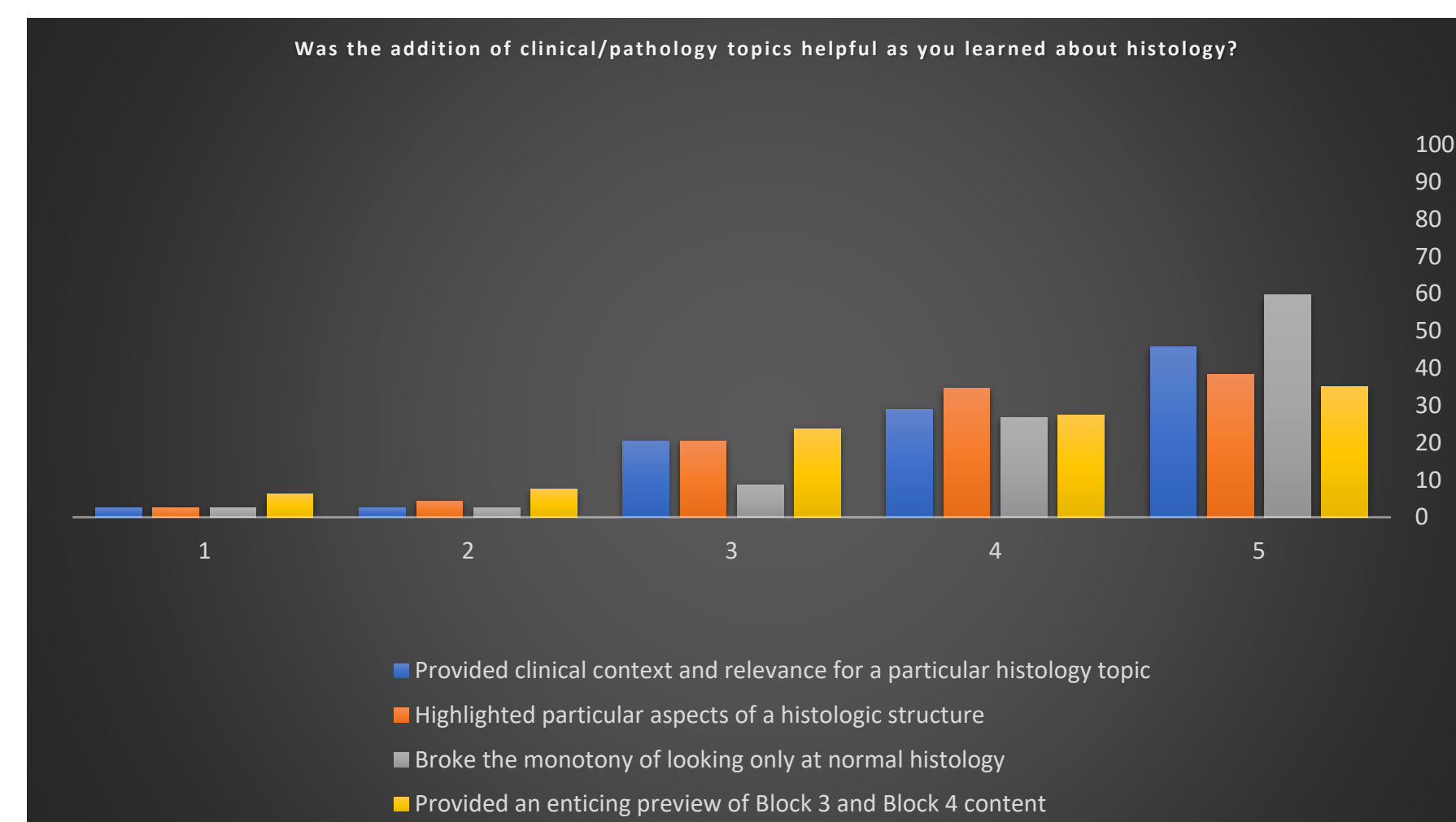
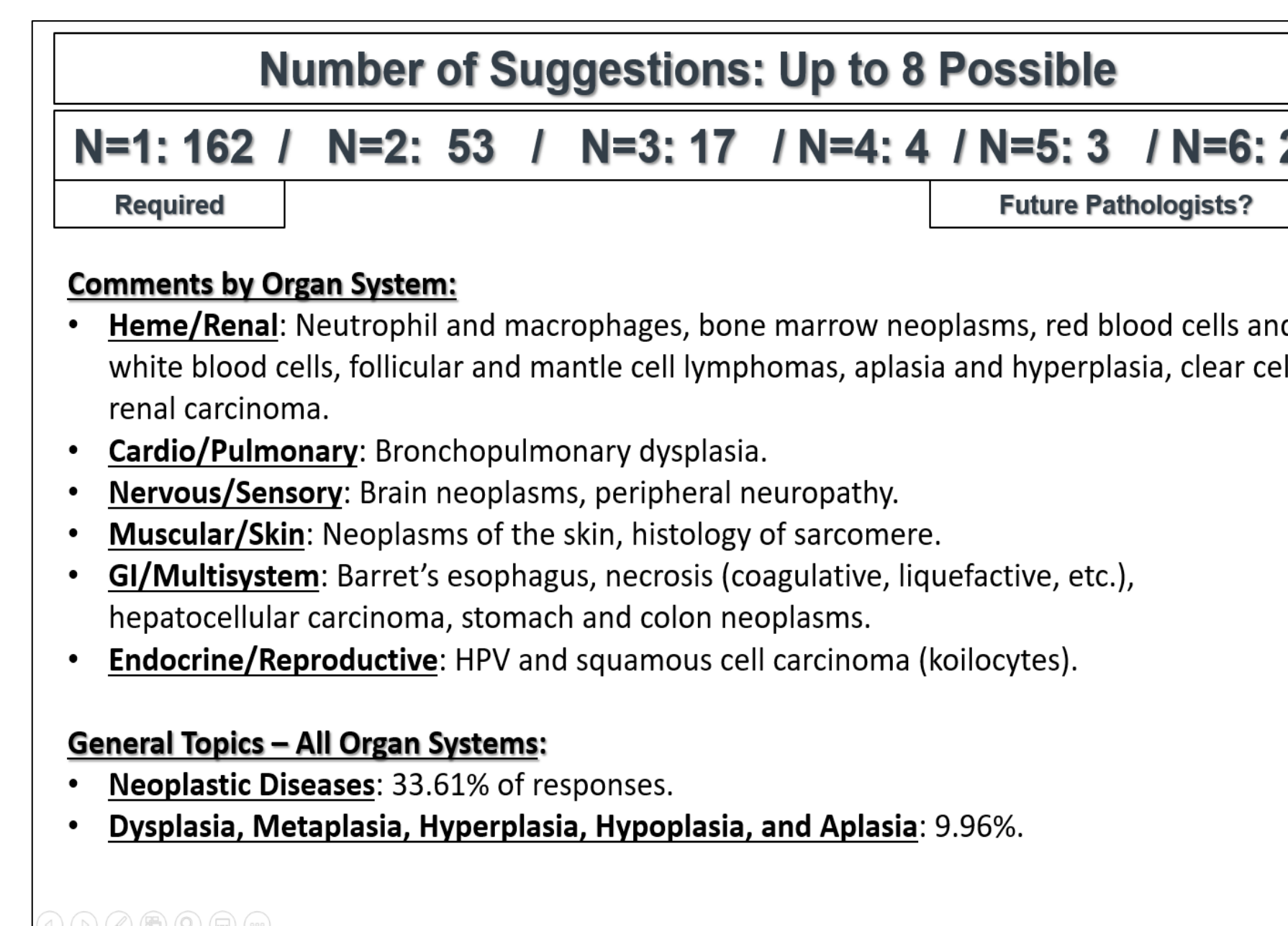


Figure 6. Suggestions for Future Addition of Topics?



## LITERATURE REVIEW

- Pathology comprises 44-52% of Step 1 tested content (USMLE.org)
- Spaced repetition is key to successful learning.
- Integrated curriculum shown to be helpful



## DISCUSSION

- A majority of students found incorporation of pathology topics along with histology content useful in that it (1) highlighted particular aspects of histologic structures, (2) provided clinical context and relevance to histology concepts, (3) broke the monotony of looking at normal histologic slides, and (4) provided a preview of pathology.
- An overwhelming majority of students surveyed thought that the amount of pathology incorporated was appropriate or that more pathology should be incorporated.
- The incorporation of pathology topics related to neoplastic diseases were commonly suggested by students who were surveyed.
- Medical education trends and our research findings both indicate further incorporation should be examined.
- Future research could study if the addition of integrated histology and pathology flipped classrooms would be beneficial to student learning.

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