

Who sends what: a comparison of dermatopathology referrals from dermatologists, pathologists and dermatopathologists

Background: Dermatopathologists, dermatologists and pathologists interpret skin pathology specimens.

Objective: To examine dermatopathology referral patterns of dermatologists, pathologists and dermatopathologists.

Methods: We retrospectively reviewed diagnoses rendered by one dermatopathologist to 916 primary interpretation cases (543 from university dermatologists and 373 from private practice dermatologists) and 517 consultations (450 from dermatologists, 52 from pathologists and 15 from dermatopathologists). Each diagnosis was assigned into one of six categories. Chi-square tests were used to compare referral types pairwise and correspondence analysis was performed.

Results: All profile comparisons tested significantly from each other (p -value < 0.01) except the comparison between dermatopathologists and pathologists. Correspondence analysis suggested that consultation profile of dermatopathologists was most dissimilar from other profiles and tended to associate more with the presence of malignant and benign melanocytic referral types. Referral pattern of pathologists was more similar to that of dermatologists who interpret skin pathology specimens than that of dermatopathologists.

Limitations: Small sample size, referral bias, difficulty classifying certain lesions.

Conclusions: Referral pattern of dermatopathologists was most dissimilar from other profiles and tended to associate more with malignant and benign melanocytic referral types. Referral pattern of pathologists was more similar to that of dermatologists who interpret skin pathology specimens than that of dermatopathologists.

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Gary Goldenberg¹, Fabian Camacho², Jacob Gildea³ and Loren E. Golitz³

¹Department of Dermatology, University of Maryland School of Medicine, Baltimore, MD, USA,

²Department of Social Sciences and Health Policy, Wake Forest University School of Medicine, Winston-Salem, NC, USA and

³Department of Pathology, University of Colorado Health Sciences Center, Denver, CO USA

Gary Goldenberg, University of Maryland School of Medicine, Department of Dermatology, 405 W. Redwood Street, 6th floor, Baltimore, MD 21201, USA

Tel: +410 328 5766

Fax: 410 328 0098

e-mail: garygoldbergmd@gmail.com

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Dermatopathology is a subspecialty of pathology and dermatology involving correlation of clinical information with microscopic observations of skin biopsies to provide diagnostic information to the treating physician.¹ There has been increasing

debate regarding the level and type of training required to sign out dermatopathology cases.

This debate reached state legal stature when an Ohio State Medical Association (OSMA) resolution on direct billing was proposed that would permit

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only licensed pathologists to bill for interpretation of pathology specimens.² Furthermore, the past President of the College of American Pathologists has stated that pathologists 'need state-based action to prohibit non-pathologists from billing for pathology services' and found 'the assertion that clinicians have sufficient training in residency to read their own slides' disturbing.^{2,3} This, despite the fact that it has been shown that dermatology residents complete more hours of dermatopathology than pathology residents and there is more dermatopathology in the dermatology literature than in the pathology literature.²

The objective of this study was to examine dermatopathology referral patterns of academic and private practice dermatologists, pathologists and dermatopathologists and correlate these to level and type of training of the referring physician.

Methods

We retrospectively reviewed diagnoses rendered by one university-based dermatopathologist to 543 primary interpretation cases sent by university based dermatologists, 373 primary interpretation cases sent by private practice dermatologists and 517 consultations (450 consultations from dermatologists who interpret skin pathology specimens, 52 consultations from pathologists, and 15 consultations from dermatopathologists). Each diagnosis was assigned into one of six categories (benign melanocytic, benign non-melanocytic, malignant melanocytic, malignant non-melanocytic, inflammatory and infectious).

Each referral type (University dermatology primary interpretation, private practice dermatology primary interpretation, consultations from dermatologists, consultations from pathologists and consultations from dermatopathologists) was represented by a diagnosis 'profile' vector in the analysis. Chi-square tests were then used to compare all distinct pairs of

profiles in order to assess which referral type had profiles that were significantly different from each other.

Next, correspondence analysis was performed on the data. Correspondence analysis is a graphical multivariable technique for performing exploratory data analysis on a contingency table that projects row and column profiles as points into an Euclidean graph.⁴ This technique was optimal in this situation because from this projection we could evaluate graphically how similar or dissimilar (according to a 'chi-square' distance measure) the profiles for each referral type were from each other. For further details on this technique, refer to Khattree and Naik⁴ and Greenacre.⁵

Results

Benign non-melanocytic category made up the largest portion (28%) of cases sent by university-based dermatologists for primary interpretation (Table 1). Benign melanocytic category made up the largest portion (44%) of cases sent by private practice dermatologists for primary interpretation. Benign melanocytic category made up the largest portion (51%) of cases sent by dermatologists who interpret skin pathology specimens for consultation. Inflammatory category made up the largest portion (27%) of cases sent by pathologists for consultation. Benign melanocytic category made up the largest portion (53%) of cases sent by dermatopathologists for consultation.

All profile comparisons tested significantly from each other (p -value < 0.01) with the exception of the comparison between dermatopathologists and pathologists. The correspondence analysis graph suggested that consultation profile of dermatopathologists was most dissimilar from other profiles and tended to associate more with the presence of malignant melanocytic and benign melanocytic referral types (Fig. 1). Referral pattern of pathologists

Table 1. Table of referral type by diagnosis type

Referral type	Diagnosis type						Total (n = 1433)
	Benign melanocytic (%)	Benign non-melanocytic (%)	Malignant melanocytic (%)	Malignant non-melanocytic (%)	Inflammatory (%)	Infectious (%)	
University dermatology primary interpretation	26	28	2	27	15	2	543
Private practice dermatology primary interpretation	44	24	2	19	7	4	373
Consultation from dermatologists	51	18	5	15	9	2	450
Consultation from pathologists	25	19	19	10	27	0	52
Consultation from dermatopathologists	53	7	33	7	0	0	15

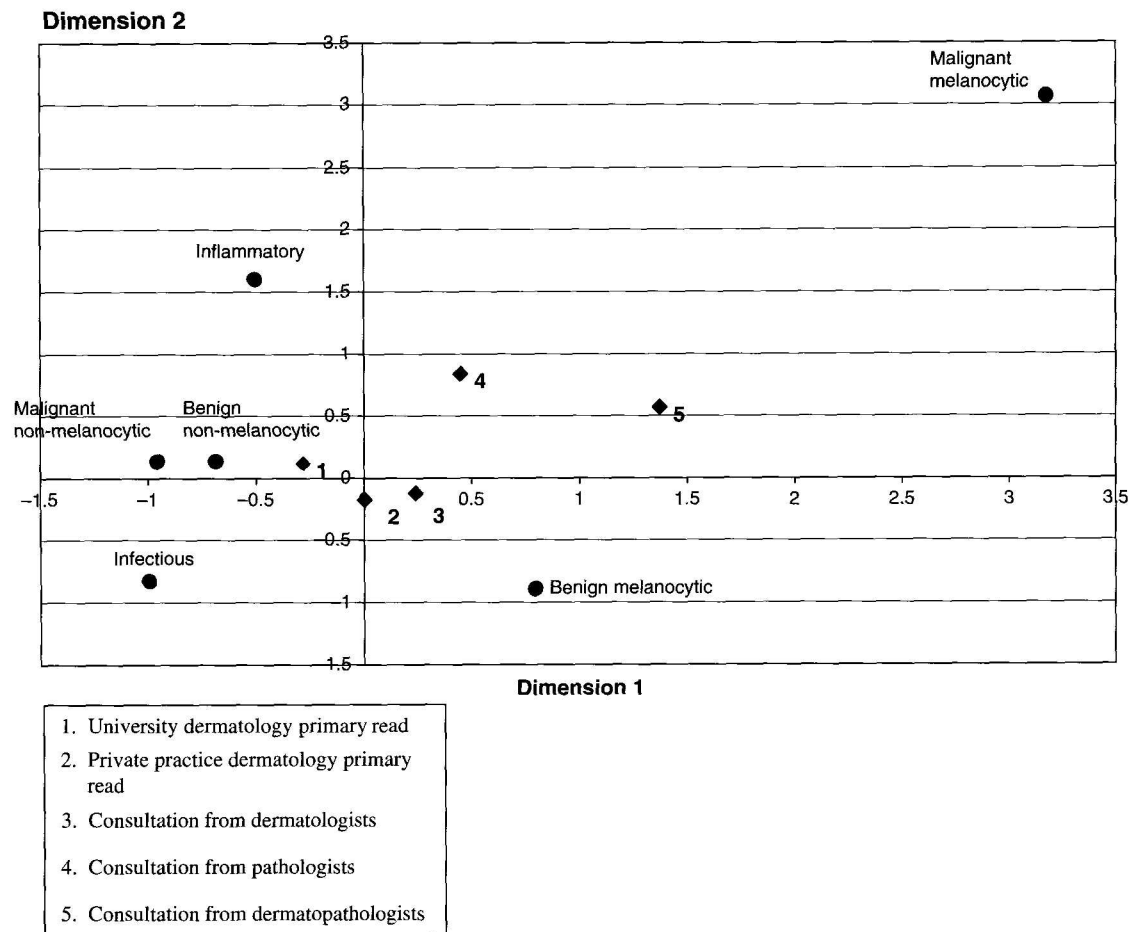


Fig. 1. Correspondence analysis plot: (i) the two-dimensional distances between referral profile points in the figure are an approximation of true chi-square distances between profiles, as the % of total 'inertia' explained by the two dimensions is 94%⁷, (ii) This is an 'asymmetric' plot: distances between referral profiles (◆) and their association to diagnosis profiles (●) can be interpreted and (iii) Distance between referral profiles (◆) assesses their degree of similarity. Smaller distances will coincide with greater similarity of profiles according to 'chi-square' distance.

was more similar to that of dermatologists who interpret skin pathology specimens than that of dermatopathologists. Diagnosis rendered to cases sent for primary interpretation by university and private practice-based dermatologists and cases sent for consultation by dermatologists clustered together suggesting a similarity.

Discussion

Melanocytic lesions, both benign and malignant, made up the highest total percentage of cases sent for primary interpretation and consultation. In fact, benign melanocytic lesions made up the largest portion of cases sent for primary interpretation by private practice dermatologists and cases sent for consultation by dermatologists who interpret dermatopathology specimens and board certified dermatopathologists. This comes not as a surprise, because melanocytic neoplasms make up 13% of all medical malpractice claims⁶ and misdiagnosis of

malignant melanoma is the most common cause of lawsuits in histopathology.⁷

The referral pattern of dermatopathologists was most dissimilar from other referral patterns. On the other hand, diagnosis rendered to cases sent for primary interpretation by university and private practice-based dermatologists and cases sent for consultation by dermatologists who interpret skin pathology specimens clustered together in the correspondence analysis graph, suggesting a similarity. This may be an expected finding, because dermatopathologists complete additional training focused on interpretation of skin pathology specimens after completing a dermatology or pathology residency, while dermatologists receive skin pathology training during residency only.

Our data indicates that the referral pattern of pathologists is more similar to that of dermatologists who interpret skin pathology specimens than that of dermatopathologists. This finding does not support the proposed OSMA resolution on direct billing that

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would permit only licensed pathologists to bill for interpretation of pathology specimens, thus preventing dermatologists from interpreting skin pathology specimens. Furthermore, our data suggests that dermatologists may be more comfortable interpreting inflammatory conditions than pathologists, because the inflammatory category made up the highest percentage of cases sent for consultation by pathologists (27%).

Differences exist between the cases sent for primary interpretation by dermatologists in university-based and private practices. Approximately the same percentage of benign non-melanocytic, malignant non-melanocytic and benign melanocytic (28%, 27% and 26%, respectively) category diagnosis were rendered to cases sent for primary interpretation by university-based dermatologists. While almost 50% of cases sent for primary interpretation by private practice dermatologists were in the benign melanocytic category. It is difficult to speculate the exact reason for this finding and additional studies, on a larger scale, may be warranted to further examine this issue.

Our study has many limitations. We examined a limited number of cases sent to one dermatopathologist. Therefore, a strong referral bias exists in this study. Furthermore, there is a regional bias, because more dermatologists in the Western US interpret skin pathology specimens than in the Eastern USA.⁸ The number of cases in each referral type also varied (e.g., the total number of consultations from dermatologists was much higher than number of consultations from pathologists and dermatopathologists). The authors may also have had a pre-existing bias, because two of the authors completed dermatology residency (G. G. and L. E. G.) and one of the authors is currently in pathology residency (J. G.). Another potential limitation is the classification of each diagnosis into the six selected categories. For example, classification of a severely atypical nevus in the same category as a benign intradermal melanocytic nevus is a potential limitation of our study.

It is probable that the debate regarding the type and level of training one 'needs' to sign out dermatopathology cases will continue. It is not the purpose of this paper to support or oppose the practice of direct billing. The objective of this study was to examine dermatopathology referral patterns of academic and private practice dermatologists, pathologists and dermatopathologists and correlate these to level and type of training of the referring physician. We conclude that referral pattern of dermatopathologists was most dissimilar from other referral patterns examined in our study. Furthermore, the referral patterns of pathologists and dermatologists who interpret skin pathology specimens were more similar to each other than the referral pattern of dermatopathologists. One similarity existed between all the profiles: melanocytic lesions, both benign and malignant, made up the largest total portion of cases sent for primary interpretation and consultation.

References

1. Goldenberg G, Patel MJ, Sanguenza OP, Camacho F, Khanna VC, Feldman SR. US dermatopathology fellows career survey: 2004–2005. *J Cutan Pathol* 2007; 34: 487.
2. Singh S, Grummer SE, Hancox JG, Sanguenza OP, Feldman SR. The extent of dermatopathology education: a comparison of pathology and dermatology. *J Am Acad Dermatol* 2005; 53: 694.
3. College of American Pathologists. An assault on our practices. 2004. Available at http://www.cap.org/apps/docs/cap_today/feature_stories/pres_column_04_04.html (accessed 21 March 2007).
4. Khattree R, Naik DN. Multivariate data reduction and discrimination. Cary, NC: SAS Institute, Inc, 2000.
5. Greenacre MJ. Correspondence analysis in practice. London: Academic Press, 1993.
6. Crowson AN. Medicolegal aspects of neoplastic dermatology. *Mod Pathol* 2006; 19 (Suppl. 2): S148.
7. Glusac EJ. Under the microscope: doctors, lawyers, and melanocytic neoplasms. *J Cutan Pathol* 2003; 30: 287.
8. Brauer JA, et al. Characteristics of dermatologists who read dermatopathology slides. *J Cutan Pathol* [OnlineEarly articles]. Available at <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1600-0560.2006.00684.x> (accessed April 4 2007).