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### Title

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### Permalink

<https://escholarship.org/uc/item/4r33j5mp>

### Journal

Dermatology Online Journal, 31(2)

### Authors

Fu, Shangyi  
Taing, Matthew  
Huynh, Danny  
[et al.](#)

### Publication Date

2025

### DOI

10.5070/D331265306

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Peer reviewed

# Deconstructing the prevalence of undifferentiated pleomorphic sarcoma across socio-demographic groups: a potential launchpad for future research

Shangyi Fu, BS<sup>1a</sup>, Matthew Taing, BS<sup>2</sup>, Danny Huynh, BS<sup>3</sup>, Brett Keeling, MD<sup>4</sup>, Ammar Ahmed, MD, FAAD<sup>4</sup>

<sup>1</sup> School of Medicine, Baylor College of Medicine, Houston, Texas, USA, <sup>2</sup> Dell Medical School, University of Texas at Austin, Austin, Texas, USA, <sup>3</sup> Software Engineering, United Airlines, Houston, Texas, USA, <sup>4</sup> Department of Dermatology, UT Austin Dell Medical School, Austin, Texas, USA

*Keywords: epidemiology, skin cancer, social issues*

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Dermatology Online Journal

Vol. 31, Issue 2, 2025

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## To the Editor

Undifferentiated pleomorphic sarcoma (UPS), formerly malignant fibrous histiocytoma, is an aggressive soft-tissue sarcoma found in the dermis or subfascial soft tissue of the trunk and upper extremities of older adults. Presently, UPS is diagnosed by exclusion of other well-classified soft tissue sarcomas, such as atypical fibroxanthoma, liposarcoma, and leiomyosarcoma. Tumors formerly recognized under the umbrella term of malignant fibrous histiocytoma (MFH) have been reclassified based on advances in immunohistochemical, molecular, and ultrastructural profiling. The taxonomy of UPS is expected to evolve and will be continuously debated. Thus, understanding up-to-date distributions of primary UPS across sociodemographic groups may help to elucidate areas for future research related to diagnosis and treatment. We sought to provide a point-in-time estimate of UPS diagnoses among demographic groups using data collected from the Surveillance, Epidemiology, and End Results (SEER).

The 2017-2018 SEER database represented 43,926,825 participants nationally, based on data from 18 registries, and the following rates are determined from direct patient information with estimates created for patients lost to follow-up. For this analysis, no Institutional Review Board (IRB) approval was needed because the data is on a public de-identified registry. Approximately 28% of the US population is represented in this sample, including relatively high proportions of racial/ethnic minorities, foreign-born individuals, and individuals living below the federal poverty line.

We performed a cross-sectional analysis of UPS prevalence using ICD-10 C49.9 and ICD-9 171.9 (*Malignant neoplasm: Connective and soft tissue, unspecified*). SEER estimated 1,712 participants diagnosed with malignant tumors of uncertain differentiation had UPS ([Table 1](#)).

Relative to age, the overall prevalence of UPS increases starting at 60-64 years old, with an upward trend culminating in the 85+ age group. These findings concur with existing literature suggesting UPS is infrequently seen in patients before the fourth decade of life.<sup>1,2</sup> Although other publications have described the highest incidence of UPS in the seventh decade of life,<sup>1</sup> with a linear increase in prevalence beyond the age of 60, this analysis reveals a distinct pattern of peak occurrence among participants aged 85 and older.

These variations in peak prevalence may be attributed to changes in diagnostic criteria for UPS, reflecting the 2002 recharacterization of MFH into more defined entities. Alternatively, these differences may also reflect advancements in data collection, such as improvements in cancer registries and increased adoption of electronic health records. Moreover, shifts in population demographics (i.e., a larger, aging population) and advances in diagnostic techniques may also contribute to the observed trends.

Among patients with UPS represented within SEER, the prevalence of UPS is highest among White participants across every age group, at an overall prevalence of 0.14%, followed by Asians or Pacific Islanders and Black Americans at 0.06% each, and then American Indians at 0.03% overall. Previous work has described UPS to predominately affect elderly White men, especially those who are chronically sun-exposed.<sup>3</sup>

Considering the high degree of cytogenetic variability in UPS, exploring the impact of genetic and environmental factors is imperative. Factors such as UV exposure, geographic latitude, and genetic ancestry may yield crucial evidence toward a more complete understanding of UPS. Altogether, the data presented here may serve as a starting point for identifying specific patient cohorts for future studies to facilitate the correlation of clinical data

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<sup>a</sup> Corresponding Author: Shangyi Fu BS, School of Medicine, Baylor College of Medicine, 1 Baylor Plaza Houston, TX 77030, Tel: 832-484-8890, Email: shangyi.fu@bcm.edu

**Table 1.** Prevalence of undifferentiated pleomorphic sarcoma in the United States stratified by age and race.

|                                           | Estimated Prevalence Percent | Estimated Prevalence Count | Population at Prevalence Date | Known Alive | Lost |
|-------------------------------------------|------------------------------|----------------------------|-------------------------------|-------------|------|
| <b>White</b>                              | 0.14%                        | 1168.5                     | 31,240,899.00                 | 1359        | 106  |
| <b>Black</b>                              | 0.06%                        | 96.7                       | 5,224,726.00                  | 90          | 8    |
| <b>American Indian/<br/>Alaska Native</b> | 0.03%                        | 7.6                        | 897,021.50                    | 7           | 3    |
| <b>Asian or Pacific<br/>Islander</b>      | 0.06%                        | 98.5                       | 6,564,178.50                  | 106         | 19   |
| <b>Unknown</b>                            |                              | 45.7                       | 0                             | 36          | 13   |
| <b>00 years</b>                           | 0.00%                        | 0                          | 522,150.00                    | 0           | 0    |
| <b>01-04 years</b>                        | 0.00%                        | 0                          | 2,159,900.50                  | 0           | 0    |
| <b>05-09 years</b>                        | 0.00%                        | 1                          | 2,732,193.50                  | 1           | 0    |
| <b>10-14 years</b>                        | 0.00%                        | 6.7                        | 2,786,556.50                  | 5           | 2    |
| <b>15-19 years</b>                        | 0.00%                        | 4                          | 2,781,405.00                  | 4           | 0    |
| <b>20-24 years</b>                        | 0.00%                        | 5                          | 2,954,646.50                  | 5           | 0    |
| <b>25-29 years</b>                        | 0.00%                        | 13                         | 3,391,241.00                  | 13          | 0    |
| <b>30-34 years</b>                        | 0.00%                        | 29.6                       | 3,191,280.50                  | 25          | 5    |
| <b>35-39 years</b>                        | 0.00%                        | 32.8                       | 3,049,214.50                  | 31          | 2    |
| <b>40-44 years</b>                        | 0.00%                        | 43                         | 2,779,268.50                  | 36          | 8    |
| <b>45-49 years</b>                        | 0.01%                        | 59.6                       | 2,889,978.50                  | 48          | 13   |
| <b>50-54 years</b>                        | 0.01%                        | 89.2                       | 2,837,532.50                  | 77          | 14   |
| <b>55-59 years</b>                        | 0.01%                        | 119.6                      | 2,873,440.00                  | 111         | 9    |
| <b>60-64 years</b>                        | 0.01%                        | 154                        | 2,591,284.50                  | 142         | 15   |
| <b>65-69 years</b>                        | 0.02%                        | 213.3                      | 2,124,581.00                  | 198         | 18   |
| <b>70-74 years</b>                        | 0.04%                        | 222.1                      | 1,598,623.50                  | 217         | 6    |
| <b>75-79 years</b>                        | 0.04%                        | 194.3                      | 1,077,416.00                  | 188         | 9    |
| <b>80-84 years</b>                        | 0.06%                        | 219                        | 736,037.00                    | 210         | 12   |
| <b>85+ years</b>                          | 0.07%                        | 10.8                       | 850,075.50                    | 287         | 36   |

with patient sociodemographics, tumor characteristics, and treatment outcomes.

Altogether, our findings suggest the prevalence of UPS continues to be greatest among Whites, with age being the greatest predictor of incidence across all demographics. These results are consistent with many other skin malignancies that are also found to be most common in elderly White males, including squamous cell carcinoma, basal cell carcinoma, and atypical fibroxanthoma.<sup>4-7</sup> With recent expansions to the SEER database, future studies may improve data granularity by characterizing differ-

ences in UPS prevalence in gender and capturing potential differences in the prevalence of UPS across different subpopulations. Evaluating the role of race/ethnicity and age with cytogenetic and immunohistochemical characteristics, represents the next steps for disentangling the etiology, pathogenesis, and taxonomy of UPS.

#### Potential conflicts of interest

The authors declare no conflicts of interest.

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