

## A survey of dermatophytes isolated from human patients in the United States from 1982 to 1984

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### Abstract

A survey of dermatophytes isolated from patients seeking medical advice was made from 1982 to 1984 in the United States. The survey included 59 locations with data from 49 cities and one state. Listing of the isolated dermatophytes and the frequency given by percentage of total follows: *Trichophyton rubrum* 46.8%, *T. tonsurans* 33.3%, *T. mentagrophytes* 10.1%, *Microsporum canis* 4.5%, *Epidermophyton floccosum* 3.5%, *M. gypseum* and *T. verrucosum* both 0.7%, *M. audouinii* and *T. terrestre* both 0.1%, and *T. violaceum* 0.06%. No isolations of *M. ferrugineum* or *T. schoenleinii* were reported.

Temporal increases were observed for frequencies of *T. mentagrophytes*, *T. tonsurans* and *M. canis*, and decreases occurred for frequencies of *E. floccosum* and *T. rubrum* when the data from this survey were compared by the goodness of fit test to data of the 1979 to 1981 survey. The percent of dermatophyte isolations identified as *T. tonsurans* correlated significantly with the percentage of blacks in cities of 100 000 or more people.

### Introduction

This second survey of dermatophytes isolated from human patients in the United States from 1982 to 1984 was again an investigation by the Dermatophyte Survey Committee. This is a committee of the Medical Mycological Society of the Americas. As in the first survey (4), the nomenclature to be used for the survey was that used by Rebell & Taplin (2). Only the taxa of dermatophytes were requested from respondents and not the site infected on the body.

### Materials and methods

Those individuals or laboratories that supplied data for the first survey were asked to supply infor-

mation for this second survey. The College of American Pathologists, through their Laboratory Improvement Office, consented to include a dermatophyte survey form with their mycology unknowns. The number of isolations of dermatophytes was principally requested, but if these were not available, an indication of the taxa isolated by means of a check mark was requested secondarily.

### Results

The results were tabulated by city or state. These results are listed in Table 1.

For a summary table, only those numerical results given were used. Table 2 gives the summary of dermatophytes isolated from 1982 to 1984 and the percentage each contributed to the total. The

Table 1. Dermatophytes isolated from human patients in the United States from 1982 to 1984.

City and State or State Alone	Year			Epidermophyton floccosum	Microsporum canis	M. audouinii	M. gypseum	M. fulvum	M. ferrugineum	M. persicolor	Trichophyton mentagrophytes	T. rubrum	T. tonsurans	T. verrucosum	T. violaceum	T. ajelloi	T. soudanense	T. terrestre
	82	83	84															
Abuquerque, New Mexico	●			1	1									1				
		●			3		1					6						
			●		5						3	8	1					
Bangor, Maine	●			1														
		●		1							1							
Bethesda, Maryland	●			1														
		●		1							1	1						
			●															
Boston, Massachusetts	●			1							5	26						
Site 1.		●			1						1	15						
			●	3	1						8	22						
Boston, Massachusetts	●			✓			✓			✓	✓	✓						
Site 2.																		
Bozeman, Montana	●				8		1				20	33	1	1				
		●		1	12						19	45	3	1				
			●	1	6		1				28	36	2	1				1
Brooklyn, New York	●			1	11	1							139	1				
		●			9						1	4	119					
			●	4	9	1					15	39	118					
Burlington, Massachusetts	●										2	6	3					
		●									2	5	2					
			●								3	4	3					
Charleston, South Carolina	●			1	1								1	48				
		●												38				
			●	1										44				
Charleston, W. Virginia	●													1				
		●												1				
Chicago, Illinois	●			4	8						8	21	39		1			
		●		2	2						2	20	35					
			●	2							2	20	31					
Cincinnati, Ohio	●				1							21	5	1				
		●		1							3	31	7					
			●	2							8	43	4					
Clinton, Maryland	●			1														
		●		1														
Coeur D'Arlene, Idaho	●				1						2	6						
		●			1						4							
Columbia, Missouri	●													3				
		●		2									17	2				
			●	1	17	1	7				22	63	24	3				
Columbia, South Carolina	●				6						2	18	25					
		●		2	2		3				3	20	37					1
			●	1	6		1				2	33	43					
Columbus, Ohio	●										2	2	1					
Danville, Pennsylvania	●			✓	✓					✓	✓		✓					
		●		✓	✓					✓	✓		✓					
			●	✓	✓					✓	✓		✓					
Denver, Colorado	●				2						1	1						
		●									1	3						
			●								1	2						
Detroit, Michigan	●			1			1				1	2	8					
Site 1.		●					2				2	5	1					
			●	2	1		1				1	5	16					

✓ = reported but frequency not given

Table 1. (Continued).

City and State or State Alone	Year			Epidermophyton floccosum	Microsporium canis	M. audouinii	M. gypsum	M. fulvum	M. ferrugineum	M. persicolor	Trichophyton mentagrophytes	T. rubrum	T. tonsurans	T. verrucosum	T. violaceum	T. ajelloi	T. soudanense	T. terrestre
	82	83	84															
Detroit, Michigan	●			25	12	1	2				97	525	146					3
Site 2.		●		39	18		3			1	78	522	150					2
			●	29	37		3				71	450	163					4
East Lansing, Michigan	●				2						5	2	2	1	1			
		●			3						2	2	2	1				
			●		3						3	1	2					
Elizabeth, New Jersey		●			1						1		3	2				
			●		2						2		2					
Evansville, Indiana	●				1						1	2						
		●									2	2						
			●								1							
Flint, Michigan	●				1	1						1	8					
		●		1									7	1				
			●										12					
Galveston, Texas	●			2	6						5	70	21					
		●		5	3		6				8	80	26	1				
			●	9	15		3				12	105	27	1				
Hartford, Connecticut	●			6	10		1				13	57	58			1		3
		●		3	13		2				6	47	101	1				
			●	7	19		7				12	50	158	1				
Indianapolis, Indiana		●			4		1					17	1					
			●		1							2						
Kansas City, Missouri	●										2		1					
		●									2	1	2					
			●								1	1						
Lexington, Kentucky	●											1	2					
		●										4	3					
			●		1		1				1		8					
Maywood, Illinois		●									2	2						
Site 1.			●								3		1					
Maywood, Illinois	●											1						
Site 2.		●										4						
			●								2	9						
Memphis, Tennessee	●										1	4	6					
		●									2	2	3					
			●								1		5		1			
Miami, Florida	●					1					2	2						
		●									2	2						
			●								2	2						
New Orleans, Louisiana	●			15	17		1				16	150	371					
		●		5	24		1				23	168	411					
			●	6	6						26	155	422					
New York State	●			3	10		2				15	69	42	3				
		●		1	2		1				10	50	14	10				
			●		6		2				5	33	6	5				
New York, New York	●			1							2	6	11					
Site 1.		●		1								10	11					
			●								3	11	4					
New York, New York	●			7	7		1				19	134	9				1	
Site 2.		●		6	6						7	107	4					
			●	11	3		1				10	121	5		1			

✓ = reported but frequency not given

Table 1. (Continued).

City and State or State Alone	Year			Epidermophyton floccosum	Microsporium canis	M. audouinii	M. gypseum	M. fulvum	M. ferrugineum	M. persicolor	Trichophyton mentagrophytes	T. rubrum	T. tonsurans	T. verrucosum	T. violaceum	T. ajelloi	T. soudanense	T. terrestre
	82	83	84															
Oklahoma City, Oklahoma Site 1			●	1	10		2				28	5	4					
Oklahoma City, Oklahoma Site 2			●	2							7	1	10					
Omaha, Nebraska	●												1	1				
		●			1						2	2		1				
			●		1						1	3						
Orange, California	●											1						
		●									1		1					
			●		1						1		4					
Philadelphia, Pennsylvania	●				6	1	1				4	71	148					
		●			4	15	1	1			7	110	184					
			●		8	23	2	1			4	95	223		1			
Pittsburg, Pennsylvania	●				2						3	57	8	1				
		●			3	1		1			4	36	1					
			●		1			1			3	46	8	2				
Port Jefferson, New York		●												1				
			●		1							1	1					
Portland, Oregon	●				1	1					1	5	1					
Site 1.		●			1	2					2	11	1					
			●								2	4						
Portland, Oregon	●				1	5						1						
Site 2.		●			1						2	1						
			●								3	3		1	1			
Providence, Rhode Island		●									1							
			●									1	2					
Rochester, Minnesota	●				24			2			51	233		5				
		●			21	11		1			61	258	1	15				
			●		17	4					41	258		4	2			
Seattle, Washington	●				1	1	1	1			6	32	1					
Site 1.		●			2	10		1			4	13	2	2				
			●		1	4					3	22	4	5				
Seattle, Washington		●									5	30	1					
Site 2.			●		1	7					6	37	1	3				
Seattle, Washington	●											7	7					
Site 3.		●									2	4						
			●									2	3					
Southfield, Michigan	●				27	6	1	2			78	120	55					
		●			27	4		2			63	123	49					
			●		26	11	2	2			60	145	61					
Tucson, Arizona	●				3	15			1		4	36	2					
		●			1	18		1			11	46	3					
			●		2	11		3			6	39						
Tulsa, Oklahoma	●				3	1		3			16	5						
		●			3	1		1			17	12	1					
			●		1			1			2	2						
Valdosta, Georgia		●			1	1					4							
			●		1						1							
Washington, D.C.	●													1				
Site 1.			●								1							
Washington, D.C.	●				1						7	5	8					
Site 2.		●			1						1	2	3					
			●		1	1					2	4	5					
York, Pennsylvania	●					1						3	2					
		●											7					
			●									3	7					

✓ = reported but frequency not given

Table 2. Totals of dermatophytes isolated from human patients in the United States from 1979 to 1984.

	Year			<i>E. floccosum</i>	<i>M. canis</i>	<i>M. audouinii</i>	<i>M. gypseum</i>	<i>M. fulvum</i>	<i>M. ferrugineum</i>	<i>M. persicolor</i>	<i>Trichophyton mentagrophytes</i>	<i>T. rubrum</i>	<i>T. tonsurans</i>	<i>T. verrucosum</i>	<i>T. violaceum</i>	<i>T. ajellii</i>	<i>T. soudanense</i>	<i>T. terrestre</i>	
	82	83	84																
	●			132	141	7	18				387	1730	1180	17	2	1	1	6	
		●		135	170	1	28			1	368	1826	1256	38				3	
			●	141	214	6	37	1			425	1889	1436	27	6			5	
Totals				408	525	14	83	1		1	1180	5445	3872	82	8	1	1	14	11635
% of Total				3.5	4.5	0.1	0.7	—		—	10.1	46.8	33.3	0.7	0.06	—	—	0.1	
Comparison										<i>M. nanum</i>							<i>T. schoenleinii</i>		
1979-1981	'79	'80	'81																
	●			92	39	6	13		1		172	1081	389	3	2	1			
		●		89	48	3	14		1	1	125	904	490	4	1				
			●	103	155	11	30	1	1	2	260	1504	932	15	9				
Totals				284	242	20	57	1	3	3	557	3489	1811	22	12	1		6501	
% of Total				4.3	3.7	0.3	0.8	—	—	—	8.5	53.6	27.8	0.3	0.1	—			

table also gives the results of the 1979 to 1981 survey with the percentage each contributed to the total.

Frequencies of reported isolations were tabulated for nine of the dermatophytes having frequencies of 5 or more for each of the two three-year periods (Table 2). Application of a goodness of fit test (5) resulted in a G statistic of 128.17 which is highly significant ( $p < 0.001$ ) when compared to 2 with 8 degrees of freedom. This implies that frequencies of one or more of the nine dermatophytes have changed over these two time periods beyond that which could be attributed to chance. Temporal increases were observed for frequencies of *T. mentagrophytes*, *T. tonsurans* and *M. canis*, whereas decreases occurred for frequencies of *E. floccosum* and *T. rubrum*.

Similar results were obtained when the goodness of fit test was applied to each of the six annual frequencies for six of the dermatophytes which had 5 or more reported isolations each year.

Rippon has stated that the vast majority of infections by *T. tonsurans* is in black children (3). The percentage of blacks in cities over 100000 population, obtained from the U.S. Bureau of Census Statistical Abstract (6), positively correlated with the percentage of infections caused by *T. tonsurans* reported for 29 cities ( $r = 0.525$ ,  $p < 0.01$ ).

Two respondents supplying data also reported isolation of a strain of *M. canis* that had very little yellow reverse pigmentation to no pigmentation at all and the absence of macrospores upon initial isolation on Sabouraud's medium plus antimicrobials. These isolations were made in Detroit, Michigan, Site 2 and Tucson, Arizona. Modified corn meal medium was used to develop few typical macrospores for identification. This strain caused cases of tinea that were very difficult to treat. Physicians treating individuals infected with this strain reported that the dosage of griseofulvin had to be increased threefold from that ordinarily recommended to obtain a cure.

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