

# Serological tests for syphilis performed in the Sexually Transmitted Diseases Diagnostic Laboratory in Poznań during 2000-2004

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## Abstract

**Introduction:** Laboratory diagnostics of syphilis was introduced in 1906, when Wassermann and associates applied for the first time the complement fixation reaction, providing the background for dynamic development of diagnostic procedures.

**Aim:** Comparison and analysis of positive serological reactions obtained during 2000-2004 in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznań.

**Material and methods:** 40 067 results of serological tests for syphilis, which were performed in a group of 25 521 persons from the whole Wielkopolska Region, were analysed. The test tool was data analysis and comparison analysis.

**Results:** Most of the serological tests for syphilis were performed in the first and the last year of the investigated period, i.e. in 2000 and 2004. From 2001 to 2003 the number of investigations was at a lower but similar level, with a slight tendency to decrease (the lowest level in 2003). The percentage of positive serological results in the investigated period was: 5.88% (2000), 6.83% (2001), 7.58% (2002), 8.86% (2003) and 6.36% (2004.).

**Conclusions:** 1. Within the investigated period a significant difference in the number of serological tests for syphilis was recorded. 2. A significant difference, between investigated periods, was observed in the case of positive results for different serological tests. 3. Patients tended to have serological tests performed more frequently in the first quarter of the year.

**Key words:** syphilis, serological tests for syphilis, syphilis diagnosis.

## Introduction

The aetiological factor of syphilis is *Treponema pallidum*, discovered in 1905 by F. Schaudinn and E. Hoffmann, which together with the genera *Borrelia* and *Lep-tospira* is a member of the family *Spirochaetaceae*. The bacterium is Gram-negative, spiral-shaped and small-sized (length of 6-20 µm; thickness of 0.15-0.2 µm). Three types of movement – rotational, progressive and pendular – which do not affect the bacterial shape and spiral depth, can be observed under a dark-field microscope. High sensitivity of *Treponema pallidum* to environmental factors, such as dryness, high temperature or antiseptics, shortens survival time of the bacterium outside a host organism to several hours. Hence, syphilis infections are almost exclusively sexually transmitted [1-8].

The origins of laboratory diagnostics of syphilis go back to 1906, when Wassermann and his co-workers used for the first time the complement fixation test, thereby providing the basis for the dynamic development of the disease diagnostics [1, 5-6].

At present, direct syphilis diagnostics consists in searching for *Treponema pallidum* in the skin or in other tissues, while detection of antibodies against *Treponema pallidum* in blood serum and cerebrospinal fluid is the aim of indirect diagnostics of the disease [1, 7].

Serological diagnostics of syphilis is based on performing at least two syphilis tests: screening and verification. Each of them should be from one of two groups of non-treponemal and treponemal tests [1, 7, 9].

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## Aim

The aim of the present study was to compare and analyse the results of serological reactions performed in the years 2000-2004 in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznan.

## Material and methods

Results of 40,067 serological tests for syphilis, which were performed on a group of 25,521 persons from the whole Wielkopolska region, were analysed.

The number of tests performed in individual years was as follows:

- 2000 – 9,232,
- 2001 – 7,714,
- 2002 – 7,251,
- 2003 – 7,103,
- 2004 – 8,767.

In 2000, altogether 7,147 persons were examined, including 2,733 women and 4,414 men.

In 2001, the tests were performed on 4,703 persons, including 2,433 women, 2,268 men and 2 persons who did not reveal their personal data, for whom the term NN is used in the following analysis.

In 2002, the tests were performed on 4,609 persons, including 2,227 women, 2,377 men and 5 NN.

In 2003, the tests were performed on 4,091 persons, including 2,213 women, 1,873 men and 5 NN.

In 2004 a group of 4,971 persons was examined, which included 2,589 women, 2,377 men and 5 NN.

In the years 2000-2003, screening tests using the USR method were performed, while in 2004 the classic RPR test was used. In addition, the following tests were performed on some of the persons in the examined period: VDRL, TPHA, FTA-ABS and FTA.

The test tools included data analysis and comparison analysis.

## Results

The results are presented in tables 1-5.

## Discussion

Serological tests for syphilis were performed on 25,521 persons from the whole Wielkopolska region in the examined period. The group included 12,195 women (47.78%), 13,309 men (52.14%) and 17 NN (0.06%). The proportion of examined women and men is presented in figure 1.

The most serological tests for syphilis were performed in the first and the last year of the examined period: in 2000, 9,232 tests were performed, of which 543 gave positive results, while in 2004, 558 tests out of 8,767 gave positive results. In the years 2001-2003, the number of serological tests remained at a similar level: in 2001, 7,714 tests were performed, of which 527 gave positive results; in 2002, 7,251 tests were performed, of which 550 gave positive results. The total number of serological tests in 2003 was 7,103, when 630 positive results were observed. The above information is presented in figure 2. In 2000

**Tab. 1.** Results of serological tests for syphilis, performed in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznań in 2000

Month	Test									
	USR		VDRL		TPHA		FTA-ABS		FTA	
	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv
I	537	1	9	2	290	12	6	6	8	5
II	439	6	5	9	262	10	9	17	12	14
III	545	2	1	1	311	16	8	27	18	17
IV	461	6	5	5	229	10	6	12	7	13
V	527	5	3	5	307	9	8	17	14	11
VI	491	9	2	8	284	11	6	14	6	13
VII	474	8	7	7	263	13	8	10	12	11
VIII	408	7	56	6	222	16	5	15	9	13
IX	423	6	37	3	262	12	8	7	10	4
X	433	7	34	3	259	13	6	12	9	9
XI	366	9	45	1	209	13	6	10	10	6
XII	164	4	35	2	86	4	4	9	3	10

**Tab. 2.** Results of serological tests for syphilis, performed in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznan in 2001

Month	Test									
	USR		VDRL		TPHA		FTA-ABS		FTA	
	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv
I	427	9	37	4	253	23	3	25	7	21
II	348	9	35	5	244	12	4	18	5	16
III	373	9	50	1	266	13	7	12	10	7
IV	374	7	56	1	294	17	13	11	14	9
V	381	7	46	3	78	5	12	18	21	12
VI	319	8	25	4	18	8	6	10	7	9
VII	390	9	47	2	174	12	9	10	10	9
VIII	337	5	20	0	256	4	13	5	11	7
IX	307	7	10	3	176	12	7	16	11	10
X	354	7	15	4	267	9	6	14	7	12
XI	365	5	6	2	264	8	6	12	5	12
XII	222	2	8	0	136	4	8	6	7	6

**Tab. 3.** Results of serological tests for syphilis, performed in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznan in 2002

Month	Test									
	USR		VDRL		TPHA		FTA-ABS		FTA	
	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv
I	366	6	6	3	112	5	5	8	5	7
II	328	3	8	1	238	5	4	11	5	10
III	286	2	14	1	210	5	7	16	8	17
IV	347	6	14	4	227	7	7	20	6	17
V	315	3	9	1	192	4	7	16	7	15
VI	319	12	38	12	215	22	12	21	11	23
VII	378	7	5	7	131	8	12	13	13	15
VIII	337	5	26	5	231	14	7	18	9	16
IX	364	7	11	5	205	7	14	16	15	12
X	387	7	12	4	186	5	14	15	17	11
XI	316	3	27	3	239	7	15	10	14	10
XII	205	6	20	2	147	7	7	12	9	10

and 2004 the greatest number of serological tests was performed in March, in 2001 and 2003 in January, and in 2002 in August.

The percentage of positive serological tests in individual years is as follows:

- 2000 – 5.88%,
- 2001 – 6.83%,
- 2002 – 7.58%,

- 2003 – 8.86%,
- 2004 – 6.36%.

In the years 2000-2003, the USR test gave the following results:

- in 2000, 70 tests out of 5,338 gave positive results;
- in 2001, 84 tests out of 4,281 gave positive results;
- in 2002, 67 tests out of 4,015 gave positive results;
- in 2003, 60 tests out of 3,774 gave positive results.

**Tab. 4.** Results of serological tests for syphilis, performed in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznan in 2003

Month	Test									
	USR		VDRL		TPHA		FTA-ABS		FTA	
	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv
I	370	8	38	5	246	13	15	15	14	13
II	332	3	22	1	245	9	13	18	13	17
III	345	6	20	4	257	11	19	14	20	14
IV	320	8	13	8	227	11	11	16	14	13
V	330	6	18	6	233	8	21	20	23	17
VI	280	5	16	4	191	12	17	17	20	17
VII	305	4	16	3	212	9	13	20	18	15
VIII	238	2	8	1	152	2	8	14	10	12
IX	292	4	14	3	207	8	13	20	16	19
X	341	4	19	7	121	11	10	28	16	23
XI	297	2	16	3	40	5	16	22	18	20
XII	264	8	12	8	36	9	21	13	21	12

**Tab. 5.** Results of serological tests for syphilis, performed in the Sexually Transmitted Diseases Diagnostic Laboratory of the Department of Dermatology, Medical University of Poznan in 2004

Month	Test									
	USR		VDRL		TPHA		FTA-ABS		FTA	
	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv	negativ	positiv
I	332	6	15	4	99	9	12	23	17	18
II	387	1	19	2	310	5	17	13	21	10
III	375	5	102	5	315	8	16	11	21	10
IV	361	1	21	2	98	3	7	6	12	6
V	367	4	16	3	272	5	16	7	17	5
VI	398	9	18	10	290	14	29	19	32	17
VII	420	5	27	3	234	13	22	19	25	18
VIII	390	5	26	8	307	7	17	22	21	16
IX	394	4	18	6	264	9	18	18	21	15
X	419	5	36	6	230	10	21	20	27	19
XI	383	7	30	6	236	7	13	12	15	9
XII	300	5	25	7	230	10	15	13	13	13

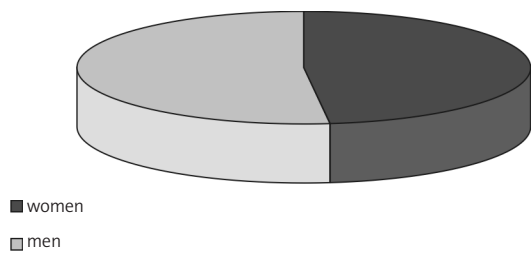
The percentage of positive USR results in the examined period:

- 2000 – 1.31%,
- 2001 – 1.96%,
- 2002 – 1.66%,
- 2003 – 1.58%.

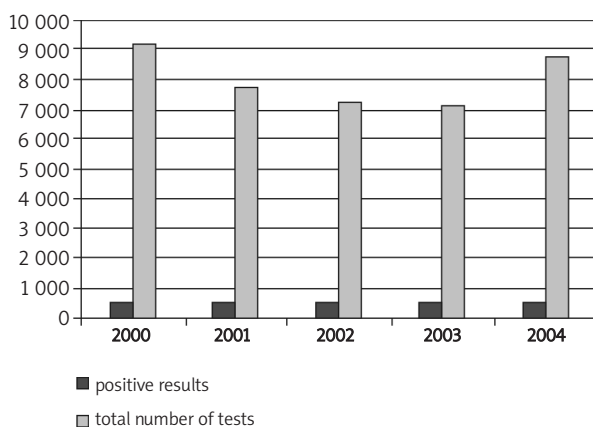
In 2004 a total of 4,583 RPR tests were performed, which gave 57 positive results, i.e. 1.24%.

The classic VDRL test in the examined period gave the following results:

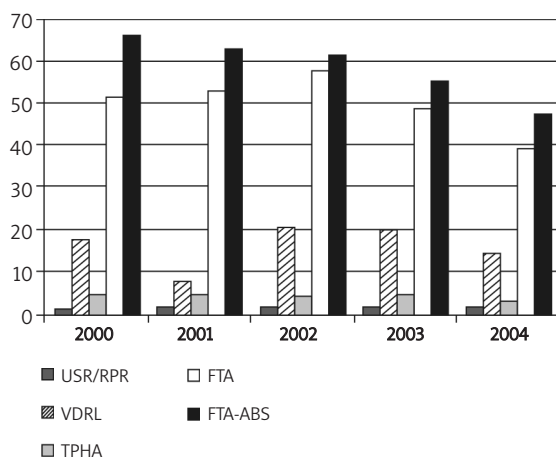
- in 2000, 291 tests were performed, which gave 52 (17.86%) positive results;



**Fig. 1.** Proportion of examined women and men in the years 2000-2004



**Fig. 2.** Number of positive results and total number of serological tests for syphilis in the years 2000-2004



**Fig. 3.** Percentage of positive serological tests performed in the years 2000-2004

- while in 2004, altogether 415 tests were performed, which gave 62 (14.3%) positive results.

The highest percentage of positive TPHA results was noted in 2001, when 2,553 tests were performed that gave 127 (4.97%) positive results. In 2003, 2,275 tests were performed, of which 108 (4.74%) gave positive results. In 2000, 3,123 tests were performed with 139 (4.45%) positive results, whereas in 2002, 2,429 performed tests gave 96 (3.95%) positive results. The lowest percentage of positive results was found in 2004 – only 100 positive results were noted per 2,985 tests, which amounted to 3.35%.

In 2002 the highest percentage of positive FTA results was observed, when 282 tests gave 163 (57.80%) positive results. On the other hand, the lowest percentage was noted in 2004 – altogether 398 tests gave only 156 (39.19%) positive results. In 2000, 244 tests were performed, of which 126 (51.63%) gave positive results; in 2001, 130 (53.06%) positive results were observed per 245 performed tests; while in 2003, 192 (48.60%) positive results were observed per 395 tests.

The percentage of positive FTA-ABS results was as follows:

- in 2000, 236 tests were performed, of which 156 gave positive results (66.10%);
- in 2001, 157 tests (62.54%) out of 251 performed tests gave positive results;
- in 2002, there were 176 positive results (61.32%) out of 287 performed tests;
- in 2003, there were 217 positive results (55.07%) out of 394 performed tests;
- in 2004, there were 183 positive results (47.40%) out of 386 performed tests.

The above information is presented in figure 3.

The above-presented data show that in the Poznań unit the highest number of serological tests for syphilis was performed in 2000 and 2004. In the other years of the examined period, the number of tests remained at a definitely lower but similar level, with a slight tendency to decrease – the fewest tests were performed in 2003. If the number of tests performed in 2000 is regarded as 100%, it amounts to 76.93% in 2003. The percentage of positive serological tests in the years 2000-2003 showed an increasing tendency, except for 2004, when a slight decrease in the percentage was observed. A decrease in the number of performed serological tests for syphilis was observed in our unit in the period 2005-2009 – 27,992 tests were performed on a group of 17,719 persons from the whole Wielkopolska region. Then a higher percentage of positive serological results in comparison with the examined period 2000-2004 was found (2005 – 10.12%; 2006 – 12.48%; 2007 – 17.07%; 2008 – 22.23%; 2009 – 18.68%) [9]. A reduction in the number of preventive serological tests for syphilis was also observed in other units, e.g. in the years 1999-2007 in the Podlaskie region [10].

- in 2001, 29 (7.55%) tests out of 384 gave positive results;
- in 2002, 48 (20.16%) tests out of 238 gave positive results;
- in 2003, 53 (20%) tests out of 265 gave positive results;

## Conclusions

1. Within the investigated period a significant difference in the number of serological tests for syphilis was recorded.
2. A significant difference between investigated periods was observed in the case of positive results for different serological tests.
3. Patients tended to have serological tests performed more frequently in the first quarter of the year.

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