

# Serological testing for infectious diseases in pregnant women: are the guidelines followed?

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## Summary

**QUESTIONS:** Are the guidelines for serological testing in pregnancy followed, and are the results on hand on admission to the labour ward?

**METHODS:** From 1.1.2007 to 31.12.2007, all patients' records were checked for serological analyses on admission to the labour ward. The serologies tabulated included tests for rubella, toxoplasmosis, hepatitis B, syphilis, HIV, varicella, cytomegalovirus infection (CMV) and parvovirus B19.

**RESULTS:** A total of 723 pregnant women were included. Rubella and toxoplasmosis serologies were missing in 1.66% of cases, hepatitis B in 2.77%, syphilis in 12.72%, and HIV in 30.57%. Serological testing for varicella, CMV and parvovirus B19 were carried out in only about 10% of patients. We found that 95.81% of Swiss/Austrian/German patients were immune to rubella compared to 89.59% for patients from other origins. A total of 50.0% of Swiss/Austrian/German patients and 27.44% of patients from other origins were immune to toxoplasmosis. As for hepatitis B antibodies (0.25 vs. 1.26%) and syphilis (only 1 patient tested positive), no significant differences were found. HIV tests were negative for all patients.

**CONCLUSIONS:** To sum up, in our collective, serologic testing for rubella, toxoplasmosis and hepatitis B is carried out in almost all pregnant women. The high rate of women not screened for HIV infection clearly contradicts the recommendations of the Federal Office of Public Health and calls for increased education of physicians.

**Key words:** serological screening; pregnancy

## Introduction

In Switzerland, it is well known that serological testing for rubella, hepatitis B and HIV is recommended for all pregnant women. Until a paradigm shift in 2009, toxoplasmosis screening was also part of the routine programme. Testing for syphilis, cytomegalovirus infection (CMV), varicella and parvovirus is recommended for pregnant women at special risk.

Many laboratories offer pregnancy-specific serological tests that are composed differently, some of them even containing testing for CMV and varicella. In our hospital, screening for infectious diseases is mandatory. For pregnant women looked after by obstetricians practising outside of hospitals and by family doctors, only few serologies are documented. Information about these cases are obtained either from the allocations to our clinic, usually sent at around 32 weeks of pregnancy, or from the course sheet the pregnant woman takes with her when admitted to the hospital.

Our aim was to find out what serological tests for infectious diseases are conducted in the catchment area of our clinic and whether the results are on hand at admission to the labour ward.

## Methods

From 1.1.2007 to 31.12.2007, all patients' records were checked for serological analyses on admission to the labour ward. The serologies tabulated included tests for rubella, toxoplasmosis, hepatitis B, syphilis, HIV, varicella, CMV and parvovirus B19. Age and parity were registered. We did not gather any data on the trimester the tests were performed in, nor did we check the patients' vaccination cards. The patients were grouped according to country of origin: pregnant women from Switzerland, Germany or Austria were allocated to group A, pregnant women from other extractions, predominantly from the Balkan States, to group B. Statistic evaluation was performed using Fisher's exact tests, and  $p < 0.05$  was considered significant.

## Results

The results are represented in table 1 and table 2.

A total of 723 women gave birth at our clinic during the period of the study. In this collective, there were 711 singleton and 12 twin births. 406 pregnant women (56%) were from German speaking countries (group1), and 317 (44%) belonged to group 2.

Serological results were not available for rubella and toxoplasmosis in 12 women (1.66%), for Hepatitis B in 20 (2.77%) and for syphilis in 92 (12.72%) cases. In the whole collective, 93% of the patients were immune to rubella. 40% of pregnant women had toxoplasmosis IgG antibodies. No woman seroconverted during the pregnancy. A total of 5 patients (0.7%) had a seroconversion for hepatitis B before pregnancy (1 in group 1, 4 in group 2). We found one case with positivity for *treponema pallidum* (group 2).

In 31% of the pregnant women, the HIV status was not known on admission day (33% group 1, 27% group 2). The titer for varicella virus was known for 80 (11.1%) patients. Nearly 89% of them had had contact with the virus (IgG antibodies detected). Additionally, in 70 (9.7%) cases sero-

logical screening was undertaken for CMV with a positive result in 48.6%. Similar results were found for the agent of fifth disease.

We compared group 1 and group 2 (table 1). Significantly more patients from group 2 were not immune to rubella. Immunity to toxoplasmosis was significantly lower in this group as well.

## Discussion

Serological testing for infectious diseases is carried out in almost all pregnant women in Switzerland despite the lack of standardised guidelines.

In most cases, results are documented in a way that ascertains their availability prior to the patient's admission to the labour ward. Our study shows that, at our clinic, serology for rubella, toxoplasmosis and hepatitis was rarely missing. Syphilis serology was available in 88% of the cases, whereas HIV serology was missing for 33% of the

**Table 1:** Positive and negative findings in the serologies of the pregnant women.

	N	%
<b>Total Number of Patients</b>	723	100
<b>Rubella</b>		
pos	673	93.08
neg	38	5.26
unknown	12	1.66
<b>Toxoplasma gondii</b>		
pos	290	40.11
neg	421	58.23
unknown	12	1.66
<b>HBsAg</b>		
pos	5	0.69
neg	698	96.54
unknown	20	2.77
<b>Syphilis</b>		
pos	1	0.14
neg	630	87.14
unknown	92	12.72
<b>HIV</b>		
pos	0	0.00
neg	502	69.43
unknown	221	30.57
<b>Varicella zoster</b>		
pos	71	9.82
neg	9	1.24
unknown	643	88.93
<b>CMV</b>		
pos	34	4.70
neg	36	4.98
unknown	653	90.32
<b>Parvovirus B19</b>		
pos	32	4.43
neg	28	3.87
unknown	663	91.70

Swiss, German or Austrian patients and for 27% of the patients from other countries. Serologic testing for cytomegalovirus infection, varicella and parvovirus was only sporadically carried out and is not a matter of routine.

In our parturients, only 3.2% of the patients of Swiss/German/Austrian origin are seronegative for rubella as opposed to 7.89% of the patients from other countries. We could not tell if these patients represent true negatives or are non-responders to at least two doses of rubella vaccination. Some of the 1.66% of patients for whom rubella data are missing might not have been screened again after they had been vaccinated at least twice [1]. The difference between groups A and B could probably be explained by sub-optimal childhood vaccination programs in their country of origin. Swiss data from 1975–1978 showed seronegativity for rubella in 8.6% of the tested pregnant women [2]. From 1990–1991, the percentage of seroprevalence for rubella in women of childbearing age was 96.5% and 90.4% for Swiss women and women from different countries respectively [3]. A study in the United States found negative titres for rubella in 9.4% of the cases [4]. Among the nursing staff of an ophthalmic clinic in India, negative rubella titres were found in 11.4% of the staff members [5]. A survey and check-up of vaccination cards in our clinic showed that only 32 out of 55 respondents were reliably protected against rubella; in the other surveys, there was no evidence of sufficient vaccination, prior disease or serologic testing [6]. Therefore, efforts to close vaccination gaps remain very important and are mandatory in medical personnel. This should be combined with efforts to improve the documentation of rubella vaccination, for instance with a vaccination card which the pregnant woman should carry

with her at all times. The postpartum period is a very good opportunity to vaccinate seronegative mothers.

In the 1990s, many obstetricians in Switzerland advocated toxoplasmosis screening [7]. Although in other countries screening for toxoplasmosis has been considered ineffective [8], testing for toxoplasmosis in pregnant women has become common in Switzerland. In our catchment area, serologic results are available for 98% of patients. Pregnant women of Swiss/German/Austrian origin were positive in 50% of cases, whereas only 27% of the patients from other countries had evidence of prior toxoplasmosis. There is evidence that the seroprevalence of *Toxoplasma* antibodies varies from one geographical region to another [9]. Immigrants from Asia or Africa are at a higher risk of infection due to a low seroprevalence in these populations. In a survey conducted in the region of Basel, it was found that seroprevalence for toxoplasmosis had decreased from 53% (1982–1985) to 35% in 1999 [9]. That fact that our catchment area is rather rural might explain the relatively high seroprevalence. Misgivings about the benefits of serological screening and of the role of possible therapies in the case of seroconversion have led to a radical change of policy which is also supported by the Swiss Federal Office of Public Health (FOPH). EUROTOXO, the European Project for the Prevention of Congenital Toxoplasmosis, found that various studies could not prove that the established strategy did result in a reduced risk of transplacental infection and of the child developing a symptomatic infection [9].

Obstetricians are advised to stop screening for toxoplasmosis; only hygienic measures are to be taken and pregnant women are to refrain from the consumption of inadequately cooked or raw meat (especially beef, lamb or

**Table 2:** Individual results of the serologies divided for group 1 (CH/D/A) and 2 (other countries).

	CH/D/A	%	Other Countries	%	p-Value	Level of Significance
<b>Total Number of Patients</b>	406	100.00	317	100.00		
<b>Rubella IgG</b>						
Pos	389	95.81	284	89.59		
Neg	13	3.20	25	7.89	0.0037	s.
Unknown	4	0.99	8	2.52	0.095	n.s.
<b>Toxoplasmosis IgG</b>						
Pos	203	50.00	87	27.44		
Neg	198	48.77	223	70.35	<0.0001	s.
Unknown	5	1.23	7	2.21	0.2327	n.s.
<b>HbsAg</b>						
pos	1	0.25	4	1.26		
Neg	399	98.28	299	94.32	0.1122	n.s.
Unknown	6	1.48	14	4.42	0.0015	s.
<b>Syphilis</b>						
Pos	0	0.00	1	0.32		
neg	351	86.45	279	88.01		
Unknown	55	13.55	37	11.67	0.2624	n.s.
<b>HIV</b>						
Pos	0	0.00	0	0.00		
Neg	271	66.75	231	72.87		
Unknown	135	33.25	86	27.13	0.0451	s.

game) and chicken [9]. In light of the lower toxoplasmosis seroprevalence in women of foreign origin (i.e., their higher risk for seroconversion during pregnancy), these women should receive additional advice regarding food hygiene.

Among the parturients of Swiss/German/Austrian origin at our clinic, almost 99% have been tested for hepatitis B infection with only 1 in 400 testing positive for the HBs antigen. Among the pregnant women of other origins, 4 in 303 tested positive for the HBs antigen; in addition, lab results were missing in 4.5%. Far higher numbers of hepatitis B positive pregnant women were found in a study in Switzerland dating from 1990–1991, namely 3% of Swiss women and 14% of foreigners [10]. Due to the high transmission rate from infected mothers to their infants, the FOPH advocates comprehensive testing of all pregnant women so that infants born to HBs antigen positive mothers can be vaccinated accordingly. We did not gather data regarding the timing of hepatitis B testing. In Switzerland, it is recommended to test in the 3<sup>rd</sup> trimester. Tests at the beginning of the pregnancy (together with other serological tests) are deemed acceptable as well [11].

As women of foreign extraction had been screened for hepatitis less often, we speculate that this group might make less use of prenatal care programs than Swiss nationals.

In Australia, more than 90% of practitioners test pregnant women for hepatitis B, and in London it is even 97% [12]; these percentages are comparable to our work. In Germany, 97% of pregnant women had been tested for hepatitis B in 2008, and 0.75% tested positive for HBs antigen [13].

Due to the low prevalence, the benefit of a general syphilis screening in Switzerland is considered doubtful and in many hospitals it is carried out in risk groups only. In our study, syphilis serology had been carried out in 87% of cases; apparently, many physicians test for it as a matter of routine. In the US [14] and the UK [12], syphilis serology in pregnant women is recommended as a routine measure. In London, the overall estimated prevalence is 4.4 per 1000 pregnant women [12].

As in many other countries, a general screening for HIV is advocated by the FOPH in Switzerland. In 1998, a Swiss study had already shown that a primary caesarean section combined with antiviral therapy with zidovudine decreased fetomaternal HIV transmission rates from 20% without intervention to 0% [15]. Similarly low transmission rates of 1–2% are reported in Germany and Austria, thanks to prophylactic measures [16]. Despite this clear data and the recommendation of the FOPH, 33% of our pregnant women of Swiss/German/Austrian origin and 27% of women of other origins had not been tested for HIV. This can possibly be explained by the fact that family physicians who have known their patients for a long time might shy away from asking them to undergo HIV testing. In Germany, similar figures have been obtained. One paper found that only 66% of pregnant women were offered HIV testing, in spite of clear recommendations [17]. In our experience, HIV testing is hardly ever refused by pregnant women, especially not if the physician explains to them the very effective therapeutic options available in case of a positive result. There has also been a change in the peri-

partial management of HIV positive pregnant women who are under sufficient HAART therapy and have undetectable viral loads. Vaginal delivery without additive zidovudine in women with a favourable obstetrical situation is nowadays an option which we should discuss with the patient. In the US, 40% of all HIV infected children were born to mothers who had not been tested during pregnancy [18]. The practice of testing risk groups only has to be questioned. In one study, only half of the women who practised unprotected sex with several men considered themselves at risk [19].

In our area, serologic testing for varicella, CMV and parvovirus B19 was performed only sporadically, and accordingly it was not possible to draw any conclusions with regard to these tests. The rather high rate of 11.3% negative testing for varicella can be explained by selection bias for this test, as it is assumed that in Switzerland seroprevalence for this disease is about 96% in children of 12–15 years of age [20].

On admission to the labour ward of our clinic, serologies are available for almost all pregnant women and it is very rare that women had no checkups at all in their pregnancies. The reason for this almost total availability of lab results might be the fact that most general practitioners that attend to pregnant women send them to the clinic prenatally, so that missing results can still be ordered. Gynaecologists, in any event, do send us their lab results without fail.

To sum up, in our collective, almost all pregnant women did undergo serologic testing for rubella, toxoplasmosis and hepatitis B, whereas syphilis serologies were not consistently ordered. It remains to be seen how closely the new recommendation to refrain from toxoplasmosis screening will be followed. The high rate of pregnant women not screened for HIV infection is unsatisfactory especially in view of the very effective antiviral therapies available and calls for even more intensive information of all physicians who provide prenatal care.

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