Antenatal rubella serology is useful for reassuring pregnant women that they are likely to be immune to measles

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New Zealand is currently experiencing a significant measles epidemic, initially centred in Auckland, but with increasing numbers appearing elsewhere.[1] There have been numerous public health messages advising people who have been in particular places such as cafes, schools, workplaces and aircraft to be alert to the possibility that they may have been exposed to infectious measles.

A recent review of severe measles in Auckland indicated that some pregnant women with measles went into premature labour, and there has been a high proportion of measles cases admitted to hospital.[2,3] These factors have compounded concern for pregnant women, and driven them to seek information about their immune status for measles. The only measles-containing vaccines available in New Zealand also contain mumps and rubella attenuated live viruses (MMR) and are therefore contraindicated in pregnancy. Many pregnant women do not have their immunisation records and are left concerned that they may be non-immune. Laboratory testing for measles IgG antibodies offers a way of testing immunity, but there may be limited laboratory capacity to perform testing outside of public health contact tracing for measles outbreak control.

All pregnant women in New Zealand are currently recommended to have rubella IgG antibody screening at the first antenatal visit. MMR vaccine was introduced in New Zealand in 1990,[4] so it is reasonable to assume that New Zealand-born women born after 1990 with antibodies to rubella will have them as a result of MMR rather than single antigen vaccine or natural infection. We therefore planned to conduct a small pragmatic study to establish whether the already available rubella antibody results could be used to predict measles immunity, and hence provide a way of reassuring pregnant women who are not sure of their vaccination history.[5,6]

One hundred and four first antenatal blood samples from routine requests were collected and tested. Names were not recorded, but the national health index number was used to determine ethnicity and whether New Zealand-born status from the national minimum dataset. Rubella and measles IgG testing was conducted using Architect Rubella IgG assay (Abbott Laboratories, Lake Forrest, Illinois, US) and Virclia Measles IgG assay (Vircell, Granada, Spain), respectively, as routinely used in our laboratory. Results were interpreted according to the manufacturers' recommendations. The study received expedited approval from the regional ethics committee.

The population characteristics are shown in Table 1.

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Table 1:

	Total	Overseas born	Unknown birth country
NZ European	45	0	6
NZ Māori	31	1	3
Samoan	10	4	2
Indian	5	1	4
Other European	5	3	2
Other Asian	2	1	1
African	1	1	0
Response unidentifiable	1	0	0
Fijian	1	1	0
Tokelauan	1	0	0
Middle Eastern	1	1	0
Pacific Island not further defined	1	0	0
Grand total	**104**	**13**	**18**

Approximately 30% of subjects were either born overseas or the information was not available, making it impossible to make assumptions about whether or not they received MMR in childhood.

As shown in Table 2, 71% and 89% of participants had serological evidence of immunity to rubella and measles, respectively. If equivocal rubella results are included in the immune group, rubella serological immunity increased to 89%.

The important finding is that only two women with immune levels of rubella IgG lacked detectable measles antibodies. One person was born in Fiji in 1992, where measles-rubella vaccination was introduced in 2003. The other was identified as New Zealand European, born in New Zealand in 1990, but we did not have any vaccination history. Our study was too small for further subgroup analysis.

A study of antenatal serology from Montreal showed higher rates of immunity to rubella and measles, but also found that rubella non-immunity predicts measles non-immunity. Interestingly they found that routine measles antibody testing showed that 28% of women were "non-immune" to measles, but when tested with the reference plaque reduction assay, the number of

Table 2:

	Measles IgG				
	All	Immune	Non-immune	Percent Immune by rubella status	95% CI
Rubella immune	71%	72	2	97%	90–100
Rubella equivocal	18%	15	4	80%	54–94
Rubella non immune	11%	6	5	55%	23–83
	100%	**93**	**11**	**89%**	**82–95**

Measles immunity groups are presented according to rubella immunity status.
Interpretation of rubella immunoglobulin G (IgG, IU/ml): < 5, non-immune; 5-10, equivocal; > 10, immune.

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non-immune dropped to 4.3%.[6] Our study therefore probably undercalls measles immunity, which would only strengthen the conclusion that a woman with immune levels of rubella antibodies is unlikely to non-immune to measles.

Another study of the relationship between rubella and measles immunity in pregnant women by Kennedy et al is interesting, because despite finding similar numbers to our study and that of Martel et al,[6] they reached the conclusion that rubella antibody levels are not useful for predicting measles immunity.[7] We believe the statistic used was misleading, which looked at all rubella results. Our hypothesis, supported by our findings, was that high levels of rubella antibodies would be a reasonable presumptive indicator of receiving MMR, and hence predictive of immunity.

We believe these results provide evidence to inform those providing advice to New Zealand-born pregnant women born after 1 January 1990 who may not be able to source their childhood vaccination records. Rubella IgG levels >10 IU/ml are predictive of vaccine-induced measles immunity, and provide a readily available way of identifying women who do not need to worry about measles if there are increasing numbers of measles cases in the community. We would still recommend measles antibody testing for a woman who has been in close contact with a known case, particularly if there is uncertainty about whether she has received two doses of MMR. These results also highlight a high proportion of women who don't have detectable rubella antibodies on first antenatal serology and hence the need to offer MMR vaccination after delivery.

Routine serological testing is generally insensitive for detecting vaccine-induced immunity and there is inter-assay variation at lower levels of IgG.[8–10] Receipt of two doses of properly administered and documented MMR is considered to provide immunity to measles and rubella in almost all cases, regardless of serological testing.[11] Even using routine serological methods, this small study suggests that New Zealand-born pregnant women born after 1 January 1990 (after the combined MMR vaccine was introduced in New Zealand) who are unsure of their vaccination history can be reassured that they are likely to be immune to measles if they have high levels of rubella IgG on antenatal testing.

Competing interests:
Nil.
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