Oepidemiological survey studies allow for the assessment of humoral immunologic response against viral structural antigens [5], despite the assumed potential bias attached to their design. Because we were aware of the importance of describing the real prevalence of rubella seropositivity in our community, we decided to document such a situation in a cohort of children receiving vaccination as part of a routine immunization schedule. Our report relies on data from a cross-sectional study performed during 2001 and 2002 involving children from an autonomous region of Spain (Castilla y León, the largest region in the European Economic Community). The chosen framework was restricted to serum samples received by the microbiology laboratory of a university hospital (Hospital Clínico Universitario de Valladolid, Valladolid, Spain) which were to be analyzed for infectious markers other than rubella antibodies. According to demographic features, a double stratification was made, and we evaluated samples from 323 children aged 1–5 years and 1166 children aged 6–14 years. All samples were aliquoted and frozen at −20°C until the moment of processing. Antibodies to proteic antigens on the rubella viral envelope were determined by means of an indirect ELISA (Bio-Whittaker). Results were validated in accordance with the manufacturer’s instructions, and samples that showed a neat absorbance greater than the cut-off value plus 15% were considered to be positive.

Our findings revealed that 309 (95.7%) of the samples obtained from children aged 1–5 years had antibodies to rubella virus (95% CI, 93.2%–98.2%); the rest of the samples were seronegative for rubella virus antibodies at the time of our study. Rubella antibodies were detected in 1055 (90.5%) of 1166 samples obtained from children aged 6–14 years (95% CI, 88.6%–92.5%), indicating a lower prevalence than that observed in the group of children aged 1–5 years; the difference was statistically significant ($P = .003$). The rate of seropositivity for rubella antibodies was 5.2% lower in the older age group than in the younger age group. An additional finding was that, in the 6–14-year-old age group, female subjects had a significantly higher percentage of seroprotection than male subjects; 534 (94.4%) of 568 female subjects had positive results, compared with 521 (87.1%) of 598 male subjects ($P < .001$).

Although we are conscious of the caution that should be exercised in this kind of study, we believe that, assuming internal validity for the evaluated population, our results indicate an age-dependent loss of seroprotection against rubella virus. Among the potential causes that support this conclusion are, on the one hand, differences in the level of vaccine coverage reached by the 2 groups of children [6] and, on the other hand, limitations inherent in the vaccine itself [7]. Moreover, it is true, of course, that in our country—as in all developed countries—systematic vaccination of girls before puberty is highly efficient in preventing congenital rubella syndrome [8]; all the same, it is certain that there are still small proportions of unprotected persons. The growing importance of immigration in developed countries is of particular interest because of the introduction of clusters of unprotected individuals [9]. The efficiency of new strategies of anticipating combined vaccines needs to be evaluated, and seroepidemiological studies seem to be a good tool for such a purpose [10].

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Efficacy of Nitazoxanide for Cyclosporiasis in Patients with Sulfa Allergy

To the Editor—Cyclospora cayetanensis is a human parasite thought to largely af-
fect children and immunocompromised patients who live in developing countries. However, since the mid-1990s, several foodborne outbreaks of *C. cayetanensis* infection have been recognized in North America, and cyclosporiasis has emerged as an important and underdiagnosed cause of diarrhea in immunocompetent persons [1]. We report a case of cyclosporiasis in an individual with a history of severe sulfa allergy who did not respond to therapy with ciprofloxacin and who was then successfully treated with nitazoxanide (Alinia; Romark Laboratories).

A 40-year-old woman with a past medical history significant only for hypothyroidism and asthma presented with complaints of profuse, watery diarrhea of several days’ duration. She did not complain of having fever, bloating, nausea, or vomiting. She denied having made any recent travel or having sick contacts. Although the patient noted a recent household dietary change to include more fresh fruits and vegetables, no other family members reported illness. The findings of her physical examination were normal. Stool specimens were sent for culture and examination for ova and parasites. The patient was sent home receiving ciprofloxacin.

Although Cyclospora species are often missed in clinical laboratories, modified acid-fast staining of the patient’s stool specimen revealed the multiple oocysts of *C. cayetanensis*. When her diarrhea did not improve several days later, she was seen in the infectious diseases clinic, where, because of a severe sulfa allergy, she commenced a regimen of nitazoxanide treatment [2]. After 7 days of treatment, her symptoms improved. The findings of follow-up stool examinations were normal. A food source of cyclosporiasis was not determined for our patient, and no other cases were reported related to her infection; however, she did comment on a recent change in her diet: incorporation of large amounts of fresh produce, including berries.

Diarrheal illness due to *C. cayetanensis* is usually self-limited in immunocompetent people, but it may cause prolonged symptoms if it is untreated, as occurred in our patient. The treatment of choice is trimethoprim-sulfamethoxazole [3], and ciprofloxacin has been suggested as an alternative agent. This latter recommendation stems from a randomized trial that compared ciprofloxacin treatment with trimethoprim-sulfamethoxazole treatment in HIV-infected patients who had *Isospora belli* or *Cyclospora* infection, and both agents were found to be effective [4]. However, there is significant anecdotal evidence of treatment failure with ciprofloxacin.

Nitazoxanide, a newer agent used primarily to treat cryptosporidiosis in patients with HIV infection, has been suggested as a potential alternative treatment. Nitazoxanide is a well-tolerated thiazolide compound with activity against many intestinal parasites [5]. It was first introduced in Central America in 1996 and has been available in the United States since 2002 [6]. In addition to its activity against a wide variety of intestinal parasites, including *C. cayetanensis*, nitazoxanide also has activity against *Clostridium* and *Bacteroides* species. The exact mechanism of action for the drug is unknown, but it is thought to act through inhibition of the organism’s pyruvate ferredoxin oxidoreductase enzyme [6]. Successful treatment of patients with *C. cayetanensis* infection using nitazoxanide has only been reported for a small number of patients [7].

Although *C. cayetanensis* is an unusual cause of diarrhea in the United States, it has emerged as an important cause of outbreaks of foodborne disease and can be found sporadically in immunocompetent people, such as our patient. Nitazoxanide represents an important treatment option for patients who have a sulfa allergy or for whom treatment with a sulfa or ciprofloxacin has failed.

References


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