Response of Volta Children to Live Attenuated Measles Virus Vaccine

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Experience so far with the Enders B-level Edmonston strain of live attenuated measles vaccine has been principally with children in the USA in whom natural measles carries a low mortality. Measles is associated with an appreciably higher mortality rate in developing countries; in Upper Volta, climate, nutritional status, degree of parasitic infestation and concurrent infections may contribute to this. The present report summarizes a pilot study in Ouagadougou, Upper Volta, designed to obtain information on the response of Volta children to Enders vaccine and to determine the feasibility of using this vaccine on a large scale.

The observations indicate that Volta children, despite the hazards of natural measles, respond in essentially the same manner to live vaccine given alone or with gamma-globulin as do children in other areas. The febrile reactions which characterize infection with the attenuated measles virus were of insufficient importance to warrant the concurrent use of gamma-globulin in a forthcoming mass measles vaccination campaign in Upper Volta.

The Enders living attenuated measles vaccine, Edmonston strain (Enders, 1960, 1963; Enders et al., 1962), has been extensively studied in children over the past several years (Collard et al., 1961; Katz, Enders & Holloway, 1962; Markham et al., 1962; McCrumb, Kress et al., 1961). A single subcutaneous inoculation of this material elicits the production of specific antibodies in 95%-100% of measles-susceptible individuals, with subsequent protection of recipients against clinical disease when exposed to virulent measles.

Concurrent use of human gamma-globulin with the vaccine, although adding both to the cost and to the complexity of the immunization procedure, diminishes the reaction without decreasing the seroconversion rates (Enders, 1963; Hilleman et al., 1962; Krugman et al., 1962; McCrumb et al., 1962; Stokes, Hilleman et al., 1962; Weibel et al., 1962).

The attenuated measles virus, unlike attenuated poliovirus, is not communicable from vaccinated children to susceptible contacts (Katz, Enders et al., 1962; WHO Expert Committee on Poliomyelitis, 1960). Moreover, children infected with attenuated measles virus do not show the electroencephalographic changes commonly found in children with natural measles (Gibbs & Rosenthal, 1962; Halonen et al., 1962).

Many developing areas experience a high mortality from measles (Morley, 1962; Ristori et al., 1962; Sénécal et al., 1962; Tanèja et al., 1962). Indeed, measles, with its complications, has been estimated to kill up to 25% of children infected during the annual epidemics in certain areas in the savanna belt of West Africa.

The present report describes a study with the Enders live attenuated measles vaccine conducted recently in West Africa as a collaborative venture between the National Institutes of Health (NIH) in the USA and the Ministry of Health of the Republic of Upper Volta. Work was undertaken between mid-November 1961 and mid-January 1962 in Ouagadougou, a city of 65,000 persons. It may be noted that measles occurs in this country throughout the year but flares to epidemic proportions annually during the hot, dry season; i.e., February through May.

The study was designed to determine whether the Enders vaccine would be as safe and efficacious in

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P. Lambin—unpublished observations.
West African children as it had been shown to be in American children.

METHODS AND MATERIALS

Study groups

Six hundred and eighty-three children of Ouagadougou participated in the study; none had a previous history of measles, and most were between the ages of seven months and three years. These were divided into three groups of approximately equal size. These assignments were made sequentially as the children presented for vaccination, with consideration given only to equalizing the ages of vaccinees in the three groups. Children in the first group (Group I) received vaccine alone, those in the second group (Group II) received vaccine followed by an injection of human gamma-globulin, while those in the third (Group III) were given only gamma-globulin. The use of the live vaccine with or without gamma-globulin corresponded to the methods extensively employed in the USA (Katz, Enders & Holloway, 1962; Kress et al., 1961; Krugman et al., 1962; Markham et al., 1962; McCrumb, Kress et al., 1961; McCrumb, Hornick et al., 1961; Stokes, Weibel et al., 1962; Weibel et al., 1962). The third group served as a control to determine the frequency and type of febrile illnesses unrelated to the vaccine occurring simultaneously in children of the community.

Evaluation of child health

Prior to vaccination, each child was given a complete physical examination by one of the two paediatricians of the NIH team. Oxalated venous blood specimens were obtained from about one-sixth of the children in each group. Haemoglobin values were determined on these specimens with the aid of a Haden-Hauser haemoglobinometer or by the Sahli method (Ham, 1956, pp. 98-100). The specimens were also examined for evidence of red cell sickling using the sodium metabisulfite cover-slip method (Ham, 1956, p. 161) and for malaria parasites using thin smears stained by Wright's method.

Surveillance

The parent was instructed to return the child to the dispensary for observation every other day for two weeks following vaccination. A nurse recorded temperatures of each child and interviewed parents. If children had fever or signs or symptoms of illness, an examination was performed by the NIH paediatricians and appropriate treatment instituted. The nurses' observations were made and recorded without reference to the group in which children were included; however, when the physicians examined the children, all available information was considered, including the record of vaccination.

A venous blood sample was obtained prior to vaccination as well as four weeks later from approximately half the members of each of the three groups. Sera were maintained in the frozen state and flown to the NIH under refrigeration for measles antibody determination by the haemagglutination-inhibition (HAI) technique (Rosen, 1961).

Materials

The lyophilized vaccine used in the present study was prepared from chick-embryo tissue cultures inoculated with the attenuated B-level Edmonston strain of measles virus (Enders, 1960). When rehydrated with sterile distilled water it contained approximately 5000 tissue culture infectious doses (TCID₅₀) of virus per 0.5 ml, the amount administered to each vaccinated child. The lyophilized vaccine was refrigerated during shipment to and storage in Upper Volta. Unused rehydrated vaccine was discarded after two hours.

The lot of human gamma-globulin employed throughout the work had a measles neutralizing antibody titre of 1 : 500 when tested by a method described elsewhere (Meyer et al., 1962). Both the vaccine and the gamma-globulin for the investigation were supplied gratis to the NIH by Dr M. R. Hilleman, Merck Institute for Therapeutic Research, West Point, Pa., USA.

Inoculation techniques

Measles vaccine was administered subcutaneously by syringe and needle in 0.5-ml amounts into the left deltoid area. Gamma-globulin was injected intramuscularly into the right gluteal area in amounts of 0.05 ml per kg of body-weight. Those children who were given both vaccine and gamma-globulin received the former a few moments before the latter.

RESULTS

Prevaccination health status of the study group

Most of the young Voltans included in the study showed evidence of one or another infectious pro-

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1 Sufficient measles vaccine was left in Ouagadougou to vaccinate the children after the return of the NIH team to the USA.
cess or of a significant nutritional disturbance when examined prior to vaccination. The most common microbial infections were respiratory disease, diarrhoea, and pyoderma. Malaria, nutritional disturbances, and anaemia are discussed in the paragraphs which follow. Despite these maladies, only five of 688 children were excluded from the study for reasons of ill-health. Two of these were suffering from measles at the time of the initial examination and the remaining three had clinical findings compatible with a diagnosis of acute malaria. It may be noted that the criteria for the selection of the children included in the present study were less rigid than those used in analogous studies (Collard et al., 1961; Katz, Morley & Krugman, 1962).

**Malaria.** Practically all the Volta children participating in the study had malaria. Microscopic examination of a single stained thin film prepared from bloods of 116 children revealed that 98% of the smears contained malaria parasites. These findings are in general agreement with the observations of Escudé & Hammon (1961). Fig. 1 presents information on the frequency of splenomegaly and parasitaemia in 116 of the participating children arranged according to age.

**Nutritional state.** The length and weight of each child were recorded and, in addition, an estimate of the general nutritional state of each vaccinee was made during the initial examination. In estimating nutrition, a grading system of 1 to 4 was used. A grade of 4 was assigned to well-nourished children, and a grade of 1 to those with emaciation, often accompanied by a markedly protruding abdomen and evidence of dependent oedema. Children graded as 2 or 3 were judged to fall between these two extremes. The recorded lengths and weights were plotted by age on the standard Stuart anthropometric chart (Nelson, 1959, pp. 43-47). Arbitrarily accepting a plot below the third percentile on the Stuart chart for either length or weight, together with our own estimates of grades 1 or 2 as evidence of suboptimal nutrition, it was possible to plot the percentage of vaccinees in each of the five age ranges who appeared to be below normal (Fig. 2). It is evident from Fig. 2 that the second and third years of life represent the period in which the abnormalities are most prominent. However, it is also evident that growth and nutrition at all ages were appreciably below the standards of Stuart. Some of the factors influencing such abnormalities are considered in the discussion at the end of this paper.

**Anaemia.** The average haemoglobin value for the 116 children examined was 9 g per 100 ml; moreover, 19% of the children had haemoglobin values of 8 g or less compared with 11-13 g for American children in this age-group (Nelson, 1959, pp. 931-933). The actual haemoglobin values obtained for each of the children are plotted according to age in Fig. 3. Stained blood smears from the 116 children revealed, in most instances, the presence of microcytic, hypochromic erythrocytes.

Sickling of red cells was observed, when appropriate techniques were employed, in two of the 116 specimens (1.7%). About 90% of the children in the study, including the two showing this trait, were of the Mossi racial stock, suggesting that this trait is relatively uncommon in this ethnic group compared with others in the region (Evans, 1944; Gans, 1961).

**Other conditions.** Among the 683 children in the study, 11 had congenital abnormalities; one had a
cleft lip, eight had physical findings consistent with a diagnosis of congenital heart disease, and two evidenced pronounced neurological defects with both mental and motor retardation (one of these had a history of prolonged apnoea at birth and the other a history of meningitis during the first year of life). Of the two with neurological defects, the one with the history of meningitis received vaccine plus gamma-globulin, while the other was in the control group and received only gamma-globulin.

Measles susceptibility of study group. Prevaccination serum samples were obtained from 315 of the 683 children (46%). Of these specimens 94% contained no demonstrable measles HAI antibodies when a 1:8 dilution of serum was tested, and the donors of the specimens were presumed to have been susceptible to measles. The percentage of susceptible children in the different age-groups varied from 99.2% in those from 7 to 11 months to 81.8% in the group from 24 to 35 months of age. The age distribution of the children in the study, together with the number considered to be susceptible on the basis of the serological sampling just mentioned, is given in Fig. 4. Those children who were immune to measles, as evidenced by HAI antibodies, were dropped from further consideration in the study.

Results of vaccination

Seroconversion. Post-vaccination specimens of blood were obtained four weeks after immunization from 203 previously susceptible children; i.e., 69% of the children from whom prevaccination specimens had been obtained. All but one of the children who received vaccine alone or vaccine plus gamma-globulin developed measles HAI antibodies to a titre of 1:32 or greater; one child in the latter group had a titre of 1:16. Thus, the conversion rate in this group of susceptibles was 100%. One child in the control group who received gamma-globulin but no measles vaccine developed measles antibodies during the period of observation and was in the exfoliative phase of measles when the second blood specimen was collected.
**Antibody response.** The levels of measles HAI antibodies in the children who received vaccine alone or vaccine plus gamma-globulin are indicated in Fig. 5. Each test included approximately the same number of sera from children from each of the three groups. A reference serum was employed in each run for purposes of correlation. The data indicate a somewhat higher antibody level for the group which received vaccine alone. The geometric mean titres for the two groups were 230 and 137, respectively, a difference which is statistically significant at the 0.01 level by the "t" test.1

**Clinical responses: fever.** The extensive studies in American children have shown that approximately 85% of susceptibles receiving Enders vaccine develop about six days later a febrile reaction lasting for several days; however, in only 20% of the susceptible children does the temperature reach 39°C. The administration of gamma-globulin along with the vaccine does not alter the day of onset of the febrile reaction.

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1 All statistical analyses were made by Dr Clifford J. Maloney, Division of Biologics Standards, National Institutes of Health, Bethesda, Md., USA.
reaction, when it occurs; however, when gamma-globulin is used, the rate of febrile reactions is reduced markedly (Enders, 1963; Katz, Enders & Holloway, 1962; Krugman et al., 1962; McCrumb et al., 1962; Weibel et al., 1962).

Careful observations were made of the febrile response of Volta children to the vaccine and to the vaccine plus gamma-globulin since this was one of the prime objectives of the study. These findings have been summarized in several ways in Table 1 and in Fig. 6. The importance of the observations on Group III cannot be overemphasized since these children provided an index of illness in the community. Without such observations on a control group, one might have attributed a considerable amount of unrelated illness to the vaccine itself.

It is evident from comparison of the data presented in the upper and lower halves of Table 1 that in Volta children, as in American children, the febrile episodes attributable to the attenuated measles virus vaccine occurred after the fifth day following inoculation. The upper part of the table, which covers the period through the fifth day, clearly shows that the febrile episodes were about evenly distributed in the three groups. In contrast, the lower part indicates that 42% of the children in Group I had rectal temperatures of 39°C or greater on one or more occasions. On the other hand, values of 12% in Group II and of 7% in Group III were recorded. In Table 1, as well as in the figures which follow, febrile responses over the range from 38°C to 40°C are recorded, primarily to provide data that might be
used for comparison with those of a number of other investigators. A temperature of 39°C was chosen as the transition point. Only those febrile episodes with temperatures of 39°C or greater were considered as being significant.

The average temperatures of members of the three groups are plotted in Fig. 6 on the basis of time during two weeks after vaccination. The data indicate that the temperatures were highest in the group receiving vaccine alone. It is also evident

<p>| TABLE 1 |
| POST-VACCINATION FEVER AMONG UPPER VOLTA CHILDREN GIVEN LIVE MEASLES VACCINE |</p>
<table>
<thead>
<tr>
<th>Group</th>
<th>No. of patients</th>
<th>Maximum rectal temperature</th>
<th>Percentage with ≥39.0°C temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt;38.0°C</td>
<td>38.0°C-38.9°C</td>
</tr>
<tr>
<td>I: vaccine alone</td>
<td>213</td>
<td>157</td>
<td>39</td>
</tr>
<tr>
<td>II: vaccine plus gamma-globulin</td>
<td>187</td>
<td>145</td>
<td>35</td>
</tr>
<tr>
<td>III: gamma-globulin alone</td>
<td>155</td>
<td>121</td>
<td>29</td>
</tr>
</tbody>
</table>

| 6-14 days after vaccination |
| I: vaccine alone | 188 | 48 | 61 | 49 | 30 | 0 | 42 |
| II: vaccine plus gamma-globulin | 140 | 65 | 55 | 13 | 3 | 1 | 12 |
| III: gamma-globulin alone | 115 | 83 | 24 | 8 | 0 | 0 | 7 |

a Number of patients returning for at least one surveillance during the appropriate surveillance period.

FIG. 6
FEVER RESPONSE (BY POST-VACCINATION DAY) OF UPPER VOLTA CHILDREN IN THE THREE VACCINATION GROUPS
from Fig. 6 that the temperatures of the children in the group receiving vaccine and gamma-globulin were appreciably lower than those of the group just discussed, during the crucial period from 6 to 10 days; however, these values were still in excess of those recorded for the control group that received gamma-globulin alone.

In Fig. 7 a comparison is made between the febrile responses of Volta and American children to the Enders vaccine given alone or with gamma-globulin. The American data are those reported by McCrumb and his colleagues (1962) since their observations are the most readily compared with ours. The data in Fig. 7 have been expressed according to both the Fahrenheit and the centigrade scales for easier comparison of the two studies. It is evident from the figure that approximately the same proportion of children in the two countries responded with temperatures of 103°F (39.4°C) or greater, whether one considers the group that received vaccine alone or those that received vaccine plus gamma-globulin. Thus, in terms of febrile episodes, the Volta children respond in essentially the same manner as do American children when given measles vaccine.

The data were examined to determine the relation of the height of the febrile reaction to the height of the immunological response (Fig. 8). Weibel and his associates (1962) have previously indicated that there was a correlation between these two factors. As Fig. 8 shows, 107 children experiencing higher fevers after vaccination tended to develop somewhat higher measles antibody titres. For example, children who received vaccine alone, with maximum temperatures falling in the ranges of less than 38.0°C, 38.0°C-38.9°C and 39.0°C or more had geometric mean antibody titres of 128, 231 and 240, respectively. Applying an analysis of variance test, these differences were found to be statistically significant at the 0.05 level. A similar relation appears to hold in the case of the vaccine plus globulin group; however, the number of instances of children with high fever is too small in this group to yield a correlation of statistical significance.

**Maculopapular rashes during 14-day surveillance.**

The frequency of rash presumably attributable to the measles virus vaccine and occurring 6-14 days after inoculation is summarized in Table 2. One of the children in Group I developed classical measles with a typical rash on the ninth day after inoculation and two children in Group III displayed the rash of natural measles on the fourth and ninth days, respectively, after vaccination. These three cases are not included in the table and are

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**FIG. 7**

**COMPARISON OF DATA FROM UNITED STATES AND UPPER VOLTA STUDIES ON FEBRILE RESPONSE TO LIVE MEASLES VACCINE**

![Graph showing comparison of febrile responses](image-url)
Incidental disease encountered during surveillance

A variety of diseases appeared among the 683 children in the study during the period of surveillance. These are discussed in detail below, but it may be stated here that they appeared unrelated to the vaccination procedure. Diagnoses were based entirely on clinical observations unless otherwise noted.

Natural measles. During the 14-day surveillance period, three children developed typical measles and one other contracted German measles. Each of the three with measles gave a history of exposure during the week preceding his vaccination; two of these were in Group III (gamma-globulin only), the other in Group I (vaccine only). This last child deserves further comment since rash and severe measles nine days after vaccination might conceivably be related to the immunization procedure. It was determined that this child had a history of exposure to natural measles five days prior to vaccination, developing prodromal symptoms of measles three to five days after vaccination with progression to typical measles with a generalized rash nine days after vaccination. One member of Group I developed German measles on the fourth day after vaccination. At the time of final bleeding (four weeks after inoculation), two additional children exhibited classical natural measles, and five others had physical findings consistent with but not definitely diagnostic of measles. All seven of these were in Group III.

Pneumonia. Two children developed pneumonia; both responded to antibiotic therapy. One of these children, in Group I, showed signs of pulmonary disease six days after receiving the attenuated virus. The other child, in Group III, had an onset of pneumonia 12 days after receiving gamma-globulin.

Convulsions. Generalized convulsive episodes occurred in two children, both of whom had a febrile illness at the time. In neither instance was the seizure attributable to measles vaccination. One child, in Group I, had a transient convulsion two days after receiving the attenuated virus; his febrile episode promptly responded to penicillin therapy, and he experienced no further difficulty later during the period of expected vaccine reaction. The other, in Group III, exhibited seizures 21 days after receiving gamma-globulin. His febrile illness responded to antibiotic and antimalarial therapy.
Gastroenteritis (vomiting, diarrhoea, dysentery). A total of 170 children had one or more episodes of gastroenteritis during the study. This occurred as frequently in the control group as in the test groups. The majority responded to conservative treatment, including temporary limitation of diet to clear fluids and administration of antibiotics. One 7-month-old child in Group II was febrile when inoculated (temperature 38.5°C), and during the subsequent four days became progressively dehydrated from severe gastroenteritis. At this point, intravenous therapy (fluids, electrolytes, and antibiotics) were instituted with good results.

Malaria. A diagnosis of acute malaria was made on clinical and therapeutic grounds in 28 instances; another 24 children had febrile illnesses that may have had a plasmodial etiology. As illustrated in Fig. 1, subclinical malarial infection was present in almost every child in the study.

Otitis media. Twenty-three children developed acute otitis media during the period of surveillance, and nine others had chronic otitis media with drum perforation. The acute cases were about equally distributed in the three groups but by chance seven of the nine chronic cases occurred in Group II.

Purulent conjunctivitis. Twenty-two children developed purulent conjunctivitis; each responded promptly to parenteral therapy with penicillin. Again, these episodes occurred in almost equal numbers in children of the three groups.

Upper respiratory disease (excluding those with otitis or purulent conjunctivitis). A total of 467 children had one or more upper respiratory infections during the surveillance period. The most frequent type of infection listed in this category was the "common cold". These infections were seen almost as frequently in Group III as in Groups I or II—namely, 66%, 79% and 65%, respectively.

Pyogenic skin infection. Pyogenic skin infections occurred in about 5% of each of the three groups. This category included those with skin ulcers, impetigo, and miscellaneous purulent lesions. Systemic treatment with antibiotics, with the additional use of moist compresses in some instances, resulted in the resolution of all of these infections.

Varicella. Three cases of uncomplicated varicella were seen.

Miscellaneous. The following diseases were also observed among the 683 children: acute cervical
lymphadenitis, 2; pertussis, 1; chronic pulmonary disease (tuberculosis?), 1; acute trachoma, 1; purulent vulvitis, 1; hepatitis (viral?), 2; acute appendicitis, 1; symptomatic helminth infestation, confirmed by stool examination, 2; and molluscum contagiosum, 2.

**DISCUSSION**

Natural measles is a disease of pronounced virulence in the Republic of Upper Volta. Why measles and its complications kill or debilitate such a high percentage of Volta children is unknown. A host of factors including diet, parasitic load, experience with infectious agents and perhaps climate may play a role.

It is the custom in the Upper Volta to breast-feed infants for one to two years. Weaning generally heralds the approach of another baby and marks the onset of a period of nutritional stress and critical adaptation for the existing child. Deprived of his relatively complete diet, he must learn to subsist without milk on a protein-low purée of millet (or other grains) which is often poorly accepted. During this period, when rapid growth accentuates his nutritional needs, an array of infectious and parasitic infestations is challenging his existence. Information presented earlier clearly attests to the ubiquitous distribution of malaria in the childhood population of Upper Volta. It is one of the major hazards of infancy in West Africa. Hookworm, bilharziasis and other helminthic infections are also reported to be extremely common. Amoebiasis and bacterial diarrhoeas are endemic. Diarrhoea and dysentery of any etiology assume special importance during the first few years of life since they further compromise the poorly nourished child (Sénécal et al., 1962). Many of the health problems mentioned above undoubtedly contribute to the prevalence of hypochromic, microcytic anaemia (iron deficiency). Documentation of the relation of climate to mortality in measles poses obvious difficulties; suffice it to say that the extreme heat and aridity in Upper Volta during the annual measles epidemics probably affect unfavourably the outcome of many diseases characterized by high fever, particularly if complicated by diarrhoea. Scrutiny of these various facets of the problems of nutrition and diseases leads one to speculate that measles frequency plays a decisive role in the close contest between survival and death of the Volta child during these first few critical years.

Those factors, whatever they may be, that in combination result in severe natural measles in Upper Volta, do not similarly affect the response of the children to the attenuated measles vaccine. No attempt was made to exclude ill or malnourished children from the pilot study, except the five previously noted, yet none of those vaccinated had any reaction that could be interpreted as detrimental to health. The incidence of fevers and rashes in the second week following vaccination was entirely comparable to that observed in similar studies in the USA. All measles-susceptible children whose sera were tested serologically developed antibody subsequently to vaccination. Use of human gamma-globulin with the vaccine reduced the likelihood of developing either fever or rash but depressed the antibody response slightly.

Vaccination is not practical during the first few months of life since transplacentally transmitted measles antibody protects the child from the attenuated vaccine as well as from the virulent disease (Markham et al., 1962; Reilly et al., 1961). For this reason it has been suggested that inoculation be deferred until eight months or more of age (Hilleman et al., 1962; Weibel et al., 1962). Twenty of the children in the present study were seven months old when vaccinated. Since seroconversion occurred in 13 of these from whom post-vaccination specimens were obtained, the data suggest that children of this age can be successfully vaccinated.

Natural measles is uncommon in Upper Volta before the latter half of the first year of life, but most children acquire the disease within the next several years. Hence, vaccination at the earliest practical age (7-8 months) is thus desirable.

Climate must be considered in any mass vaccination plans in West Africa. About 90% of the population of the Upper Volta live in rural areas (Clairin & Cantrelle, 1962) and are relatively inaccessible during the rainy season; i.e., June through September. The hot, dry season of February through May, when the remnants of last year's harvests are being consumed, is a period of great

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2 Personal communication from J. Goarnisson, Ouagadougou.
3 It is worth noting that results of subsequent studies with measles vaccine in this same area indicated that children from five to seven months of age had a reduced conversion rate, presumably because of the presence of maternal antibodies. Detailed information will be published, but it may be noted now that the seroconversion rates were 50%, 76%, and 90%, respectively, for those 5, 6 and 7 months of age, while among the children 8 months or older the conversion rate was greater than 97%.
environmental stress and coincides with the epidemics of measles and meningococcal meningitis. Under these circumstances, measles vaccination could best be accomplished during the cooler, dry season—i.e., October through January—before the onset of epidemic measles.

As a general conclusion it may be stated that the present study has established that Upper Volta children can be safely and effectively vaccinated with the Enders live measles vaccine either with or without concurrent administration of gamma-globulin.

RÉSUMÉ

A Ouagadougou (Haute-Volta) 683 enfants ont été inclus dans une étude pilote sur le vaccin anti-rougeole vivant. Le but de l'étude était de savoir si le vaccin Enders de souche Edmonston B, bien toléré par les enfants américains, était aussi inoffensif et efficace pour les enfants d’Afrique centrale. Les sujets ont été répartis en 3 groupes d’importance sensiblement égale. Le premier groupe n’a reçu que le vaccin; le deuxième a reçu d’abord le vaccin puis, peu après, une injection de gamma-globuline humaine; le troisième (groupe témoin) n’a reçu que de la gamma-globuline.

Les enfants ont été soumis avant la vaccination à un examen médical complet; après la vaccination ils ont été suspendus trois semaines sous surveillance médicale. Les auteurs présentent et analysent les données relatives à l’état général et nutritionnel, à la prévalence des infections bactériennes, du paludisme, de l’anémie et du caractère drépanocytaire chez ces enfants. Des essais sur le taux de réponse immunologique ont porté sur 315 échantillons de sang prélevés avant la vaccination et 217 prélevés après celle-ci; ils ont montré que 94% des sujets étaient, avant la vaccination, sensibles à la rougeole alors que 100% des sujets vaccinés (avec ou sans adjonction de gamma-globuline) possédaient des anticorps détectables.

Comme prévu, l’incidence et la gravité des réactions fèbriles post-vaccinales ont été plus grandes dans le groupe recevant seulement du vaccin que dans celui recevant en outre la gamma-globuline. Cependant dans l’un et l’autre groupe, les réactions cliniques ont été analogues à celles observées chez les enfants américains. Les sujets ne recevant que du vaccin et ceux présentant une réaction fédérale ont dans l’ensemble fourni une réponse en anticorps plus marquée. Il n’y a pas eu d’observations permettant de penser que la vaccination exerce sur un paludisme préexistant ou sur les maladies infec- tieuses une influence aggravante.

La présente étude montre qu’en Haute-Volta les enfants peuvent, en dépit des parasitoses, des infections et des déficiences alimentaires dont ils sont souvent atteints, être vaccinés sans danger et avec efficacité par le vaccin anti-rougeole vivant Enders avec ou sans administration associée de gamma-globuline.

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