C V I F O R U M

Number 6
April 1994

In this Issue

A Forum guide to … mucosal immunization

In this occasional series, the CVI FORUM *takes the reader for a brief tour of some of the topics on CVI's priority list. High on that list is mucosal immunization.*

Q ***What is mucosal immunization?***

A It is the administration of a vaccine that enters the body via the mucosal membrane (mucosa) lining the body's passages and cavities, eg. the gastrointestinal, respiratory and urogenital tracts, the nasal passages, the middle and inner ear and the eyes. Any vaccine given by mouth, for example, will take the intestinal mucosal route of immunization. Only three such vaccines exist: for polio, cholera and typhoid fever.

Q ***How does mucosal immunity work?***

A Mucosal tissues perform a twofold function: to facilitate the passage into the bloodstream of essential molecules, such as nutrients, and to prevent the passage of harmful substances, such as disease-causing organisms (pathogens). Certain mucosal cells, called "M-cells", play a central role in this process. They are superbly equipped to carry many kinds of substances across the mucosal surface and to bring them into contact with the immune cells (lymphocytes) of the mucosal system. These immune cells secrete antibodies, called secretory IgA antibodies, that neutralize or destroy substances, such as pathogens, which the cells recognize as foreign to the body. Moreover, the mucosal immune system stores the memory of invasive pathogens and can produce IgA antibodies that will specifically deter or destroy future invasion. The first task of mucosal vaccines, which contain harmless forms of pathogens, is to provoke an IgA response that shows the mucosal immune system what the pathogens look like, allows it to remember what it has seen and thus provides lasting protection against the real pathogens.

Q ***But does a vaccine given orally only protect against pathogens that attack the gut? Would you, for example, need to administer a vaccine by aerosol into the lungs to protect against respiratory pathogens?***

A Not necessarily. Recent research has shown that mucosal vaccines can provoke a response in many different sites: this is because some of the mucosal IgA antibodies, as well as the lymphocytes that produce them, can travel to far-off places in the body. And indeed experiments are showing that certain mucosal vaccines administered by mouth or into the nose can stimulate intestinal and respiratory immunity. Yet other oral vaccines can stimulate vaginal or rectal immunity, which could be useful for an AIDS vaccine.

Q ***Why is mucosal immunization a CVI priority?***

A For several reasons: First, most of today's common vaccines are given by injection. Compared with a drop into the mouth, nose or ear, injectable vaccines are clearly more complicated to administer, more costly and require special precautions to avoid transmission of infection. Second, 80-90% of infectious diseases are caused by bacteria or viruses that enter the body via the mucosal tissues and it makes sense to block and destroy them before they go any further. Third, the mucosa has a huge immune system, largely untapped for vaccination purposes. The mucosal surfaces of an adult's body, for example, measure 400 sq. mt. vs. less than 2 sq. mt. of skin surface. The gut lining alone is the largest immunological organ in the body. It makes sense to use that system for vaccination purposes. Fourth,

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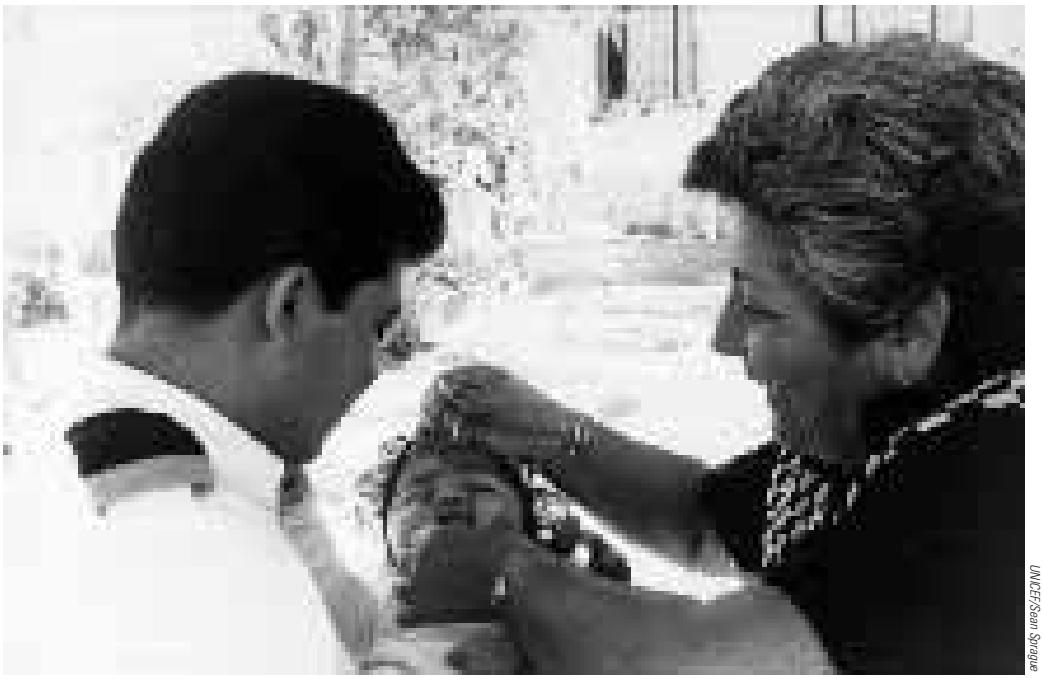
Cover photo: UNICEF/ Francene Keery



UNICEF/Sean Sprague

The oral polio vaccine, being given to this Mexican child, is the most widely used vaccine to enter the body by the mucosal route.

experience with the oral polio vaccine indicates that mucosal immunization can provide strong, lasting protection against infection. And finally, advances in cellular and molecular biology, particularly recombinant DNA technology, suggest that the shortcomings of mucosal immunization can be overcome.

Q ***What shortcomings?***

A Generally speaking, mucosal vaccines have to be given in much larger quantities than injectable (parenteral) vaccines to get the same degree of protective immunity. Also second or third doses are usually needed to enable a mucosal vaccine to stimulate immunity in several mucosal sites. Further, mucosal immunity tends to fade more quickly than systemic immunity. And finally, oral vaccines have to withstand the stomach's destructive, digestive juices.

Q ***How can these drawbacks be overcome?***

A Researchers are working on several approaches. One is to use a naturally immune-stimulating or immunogenic substance, such as a live bacterium or virus or a mixture of both, to carry the vaccinating molecule or antigen into the body. By recombinant techniques, scientists today can divest such vectors of their pathogenicity without affecting their powerful immunogenicity. Another approach is to use artificial microspheres to carry the vaccine antigen. Yet another, is to administer certain chemical substances that prevent gastric secretions from destroying vaccine without disabling mucosal defences against true pathogens.

Q ***What are the most important diseases that researchers believe could be prevented by mucosal vaccines?***

A The main child killers, such as diarrhoeal diseases and acute respiratory diseases. Diarrhoeal diseases include cholera (an oral vaccine exists but is not effective enough, especially in developing countries) and typhoid fever (*idem*), gastrointestinal disease caused by *Escherichia coli* (enterotoxigenic *E. coli* or ETEC), shigellosis and rotavirus. Acute respiratory diseases include respiratory syncytial virus disease, pneumococcal pneumonia, whooping cough, influenza and measles. Then there are the sexually transmitted diseases: AIDS, first and foremost, but also chlamydial, herpes simplex virus and human papillomavirus infections, and gonorrhoea.

Advances in cellular and molecular biology, particularly recombinant DNA technology, suggest that the shortcomings of mucosal immunization can be overcome.

Mexico's immunization programme gets results

"The priority given to immunization should continue. All Mexico's political parties have made that commitment."

Creating a new nation. A new international stature. Mexico is enjoying a good press these days, if these recent plaudits from development writers are any guide. Praise is certainly due for its efforts to improve its people's health: with a nearly 60% drop over the past decade in deaths of children under five to a current rate of 33 per 1,000 live births, Mexico has joined the twenty nations listed by UNICEF as making most progress in reducing child deaths since 1980[1].

Much of this progress can be credited to Mexico's immunization programme, which has brought the proportion of fully immunized children under five years of age to 94% over the last five years[3]. And, in the view of Federico Chavez-Peón, Director of International Affairs at the Ministry of Health, Mexico's President, Carlos Salinas de Gortari, has been instrumental in the programme's success. "He takes a personal interest in childhood vaccination and makes a point of supervising our twice-yearly immunization coverage surveys." Whatever the outcome of this year's presidential elections, Dr Chavez-Peón notes, the priority given to immunization should continue. "All Mexico's political parties have made that commitment."

Federico Chavez-Peón

Mexicans by and large are aware of the need for vaccination, says Dr Chavez-Peón. Awareness is maintained by enlisting the mass media, especially radio and TV.

IN A NUTSHELL	
Population (estimate 1992)	85 million[2]
No. of births a year:	1.9 million[3]
Infant mortality rate (< 1 yr):	28 per 1,000 live births[4]
Child mortality rate (<5 yr):	33 per 1,000 live births[4]
% of national budget for health:	12[3]
human development rank:	53[5]
main immunization thrusts:	polio and neonatal tetanus[3]
priority vaccine needs unmet:	hepatitis B, rubella, dengue, meningococci, *Salmonella*[3]
major health concerns:	the health of women and children, acute respiratory diseases, diarrhoeal diseases, cardiovascular diseases, chronic degenerative diseases, road accidents (for the 14-25-yr age-group)[3]
major ongoing health measures:	safe motherhood, including hospital delivery and promotion of breast feeding, "border initiative" primary health care programmes between twinned US-Mexican cities, boosting vitamin A supplementation in the diet, training for use of oral rehydration therapy[3]

Sources 1.The Progress of Nations, UNICEF, 1993. 2.World Bank Atlas, 1994. 3. Government of Mexico. 4. The State of the World's Children 1994, UNICEF. 5. Human Development Report 1993, UNDP.

Particularly helpful, he says, has been the collaboration of the country's biggest private television station, which gives free air time to health clips. The result? "When we need them, people come forward by the hundreds, even thousands, to help us dispense vaccines." Even the army helps in organizing Mexico's "immunization weeks".

The country's enthusiasm for vaccination seems to be paying off. Not only is child mortality falling, but the country can take its share of credit for the continent's apparent success in wiping out wild poliovirus – no cases have been detected in the Americas since August 1991. Riding on this momentum, the Mexican health ministry has put measles on its hit-list of vaccine-eradicable diseases and aims to strengthen disease surveillance and boost immunization coverage beyond the current 92% level. With only 150 cases confirmed in 1993, vs. 529 in 1992, the trend is in the right direction. Further along the road, neonatal tetanus is also slated for elimination as a public health problem, but progress is slower – 90 reported cases in 1993 vs. 115 in 1992 and a mere 42% coverage of pregnant women.

UNICEF/Sean Sprague

The writing is on the wall...for several childhood diseases targeted by Mexico's immunization campaigns.

Dr Chavez-Peón admits that Mexico's immunization programme is not without its snags. There are several communities, for example, living in mountain areas where a 24-hour journey on horseback is the only way of bringing vaccine to the children. Nor does the often extensive flooding in parts of the country, such as in the south-eastern state of Tabasco, make life easy for health workers. All in all, the immunization programme fails to reach only about 2-3% of children, notes Dr Chavez-Peón. There are also areas of the country where long spells of above 40°C temperatures have made it necessary to reinforce cold chain logistics and invest heavily in the robot-like refrigerators, nicknamed, from the Star Wars film, "R2D2s" (or, with phonetic licence, "arturitos").

Mexico also has its share of vaccine-resistant religious groups, such as Mennonites and Jehova's witnesses, particularly in the northern Chihuahua and Zacatecas states, but "we've established an ongoing dialogue with these people and on the whole they're coming round to accept the need for vaccination".

Does Mexico see the need for the multivalent, single-shot, high-tech vaccines that are on CVI's research agenda? "Technological improvements usually bring added costs," explains Dr Chavez-Peón. "We're reasonably comfortable with the vaccines we have, although we're not producing enough to meet our needs and have to rely on UNICEF and Rotary International. Our main concern is keeping up the pressure to get these vaccines into as many children as possible."

"We've established an ongoing dialogue with these people and on the whole they're coming round to accept the need for vaccination."

Turkey still set on universal immunization despite hurdles

During Turkey's first national immunization campaign in 1985, more than two thirds of the nation's five million children under five were vaccinated against the major childhood diseases. UNICEF declared the campaign "an unprecedented national effort" and forecast that Turkey was "on course for universal immunization by the end of 1986"[1]. The campaign certainly achieved its immediate goals. But today, in the Spring of 1994, with about 70% of under-one-year-olds fully immunized, Turkey has still some way to go before attaining universal coverage.

Münevver Bertan, who heads the Public Health Department at Ankara's Hacettepe University, has for the past decade been an adviser on child health to Turkey's health ministry and was coordinator for the 1985 campaign. She blames a three-fold difficulty for the disappointing delay: that of finding, reaching and keeping newborn babies.

"Keeping track of infant births is a real headache," says Prof Bertan. "Only half of the 150,000 babies born each year are delivered in hospitals. The rest are born at home. And parents are not obliged to register births soon after delivery. So even with nearly 80% of births attended by health personnel, there are still newborn babies that we cannot reach with vaccines."

Münevver Bertan

The problem, she adds, is compounded by the large numbers of people continuously on the move in Turkey. Moreover, for the past three or four decades huge numbers of people – nearly two million of them every year – have been pouring from the countryside into the cities. "It is even harder to keep track of births in the cities," says Prof Bertan. "For example, in the countryside, midwives make home visits and that helps identify babies who have to be vaccinated. But in the cities such visits can't be done so easily."

This notwithstanding, a study completed last year by the health ministry and Hacettepe University, with financial backing from the United States Agency for International Development, showed an under-two-

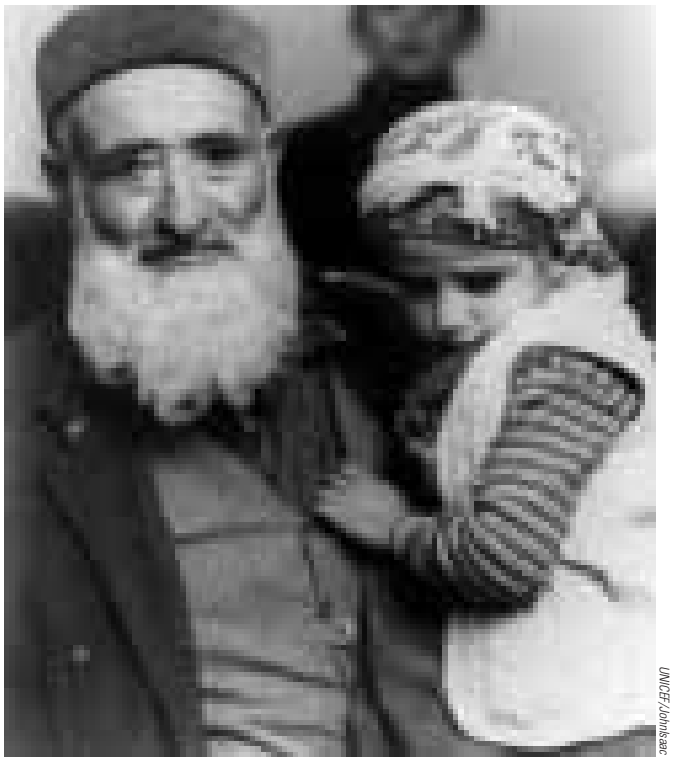
"In the countryside, midwives make home visits and that helps identify babies who have to be vaccinated. But in the cities such visits can't be done so easily."

IN A NUTSHELL	
Population (estimate 1993)	56.5 million[2]
No. of births a year:	150,000[2]
Infant mortality rate (< 1 yr) (1993):	53 per 1,000 live births[2]
Child mortality rate (<5 yr) (1993):	61 per 1,000 live births[2]
% of 1-yr-olds fully immuized:	62[2]
% of national budget for health:	4.3[2]
Human development rank:	73[3]
Major health concerns:	Neonatal mortality, infectious diseases, accidents[2]
Major ongoing health measures:	Family planning, safe motherhood, all child survival programmes[2]

Sources 1.The State of the World's Children 1986, UNICEF. 2. Government of Turkey. 3. Human Development Report 1993, UNDP.

year-old immunization coverage level of 74% for cities vs. 51% for the rural population. Explains Prof Bertan: "Although the primary health care services are better organized in rural areas, cities have higher immunization coverage rates because they have more hospital facilities and private physicians, and the city people use these facilities for primary health care."

Reaching the children is a second difficulty, not surprisingly for a country that is mostly mountainous. In the east and central part of the Anatolian plateau, where winters can be severe enough to halt all road traffic – where roads exist – life can be hard for health workers trying to carry vaccine to remote villages. Again, this difficulty is reflected in the variability of immunization coverage revealed by the 1993 study: 81% in the more clement South, with its hot, dry plains bordering the Mediterranean and Aegean seas, vs. 40% in the rugged east.



UNICEF/Johnsaac

Bring in your children! This grandfather from the Turkish village of Küpruköy answers the call of a national vaccination campaign.

Finally, keeping children in the immunization programme until they have completed the full dose-schedule, is "a real nightmare", admits Prof Bertan. "Mothers are not as aware as they should be of the importance of immunization." Turkey's drop-out rate, she says, is about 10%. Women's education is an important contributing factor: less than half of Turkish women receive a secondary education. And, as the 1993 study showed, immunization coverage among children whose mothers had been given a secondary education was 80% vs. 46% for mothers who had not.

But mothers are not the only problem. "The health professionals also have not fully assimilated the immunization message." Health workers, for example, often – in 30-40% of cases, Prof Bertain says – fail to take advantage of a child's attendance at a health centre to administer vaccines.

Yet, the health ministry has an ongoing communications programme and tries to enlist the help of the mass media. "The trouble is," says Prof Bertain, "immunization is not hot news for reporters or editors."

Despite these difficulties, she is optimistic that the picture will brighten over the next few years. And indeed two new developments suggest Turkey is still taking immunization seriously. Last year saw the creation of a National Advisory Immunization Council, that is taking a close look at the different obstacles to achieving higher coverage rates and suggesting to the health ministry how they can be overcome. Secondly, Turkey's National Paediatric Association, of which Prof Bertan is president, has begun to work closely with the new Council – and also with the health ministry and UNICEF. "We're experimenting," she says, "with different ways of raising immunization coverage and of standardizing schedules in as many provinces as possible. Already, activities have started in several of our 67 provinces."

A glance at the past also brightens Prof Bertan's view of the future: "Before our first immunization campaign in 1985, less than 30% of our children were covered by immunization and more than 50,000 Turkish children every year were dying from vaccine-preventable diseases. Today, percent coverage is in the 70s. We're not up to the European average [about 80%]. But you've got to admit we've come a long way."

Immunization coverage among children whose mothers had been given a secondary education was 80% vs. 46% for mothers who had not.

Vaccines against lethal pneumococcus soon to enter field tests

More than a million infants in developing countries die of pneumonia and acute infections caused by pneumococcus.

Every year, according to recent estimates, more than a million young children in developing countries die of pneumonia and acute infections caused by the bacterium *Streptococcus pneumoniae* (pneumococcus). Within the next 24 months scientists expect to start field trials of a new vaccine designed to prevent many of these deaths.

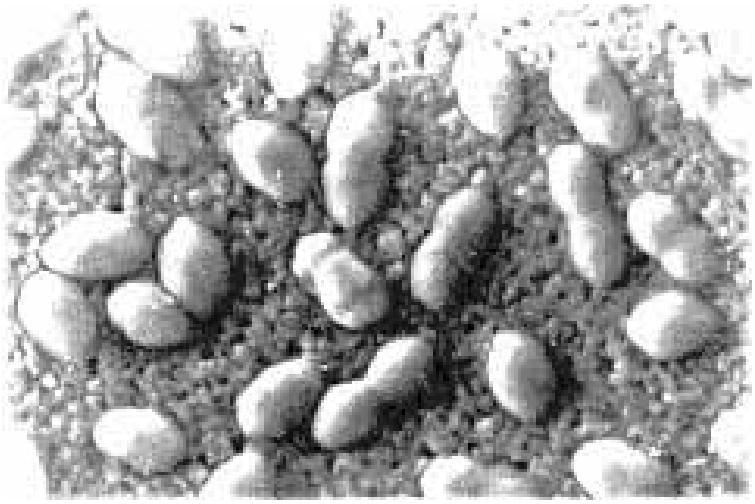
Last November, WHO brought to Geneva a group of experts – researchers and representatives of vaccine manufacturers and potential funding agencies – to lay the groundwork for trials of this vaccine, as well as of several other similar vaccines that are at earlier stages of development.

A pneumococcal vaccine already exists, but it is not effective in young children. The new vaccines use immune-stimulating molecules (antigens) linked (conjugated) to a carrier protein, which should trigger protective immunity even in infants. A similar conjugate vaccine against *Haemophilus influenzae* type b (Hib), which causes meningitis, as well as respiratory disease, is proving effective in children of all ages.

The meeting, which was organized by WHO's Division for Diarrhoeal and Acute Respiratory Disease Control, made several recommendations for conducting field trials of potential pneumococcal conjugate vaccines. The trials will assess safety and immunogenicity in small groups of infants and young children (Phase II), and safety and protective efficacy in large groups before (Phase III) and after (Phase IV) regulatory approval.

Among the recommendations of the meeting were the following:

- A vaccine combining antigens of the nine commonest types (serotypes) of pneumococcus would be adequate for use in developing and developed countries.
- The ability of the pneumococcal vaccines to produce a strong immune response should be evaluated in different groups of children, eg. children of diverse racial origin, HIV-positive children and children with parasitological evidence of malaria infection.



CNRI

***Streptococcus pneumoniae* (pneumococcus), a killer of young children in developing countries**

- Other ways of preventing pneumococcal disease should be considered, such as use of the currently available vaccine to immunize mothers and thereby protect their newborn infants.

Readers interested in the full report of the meeting should contact Dr Nathaniel F. Pierce, WHO/CDR, Avenue Appia 1211 Geneva 27, Switzerland [Fax: 41.22/788.18.13].

Annual get-together garners support for CVI, updates goals and estimates financial needs

Japan, hosting the third meeting of the CVI's Consultative Group last November in Kyoto, used the occasion to underscore its commitment to the Initiative. First, Isao Arita, Chairman of Japan's Agency for Cooperation in International Health and convener of the meeting, pointed out in his opening address that it was "the largest ever to take place in Asia devoted solely to vaccines". Then, Kayoko Hosokawa, wife of the then Japanese Prime Minister, declared she would undertake a personal fund-raising crusade for the CVI in her country. Finally, OMRON Corporation, a leading Japanese industrial concern, donated 100 million yen (nearly US$1 million) to the CVI.

The Consultative Group brings together every year the CVI's participating organizations, institutions, agencies and individuals. This year, 250 participants from 33 countries reviewed the CVI's work since its creation three years ago.

A few nuggets from other presentations:

- Failure to maintain the political and social will demonstrated so far could "jeopardize the global eradication of polio and impede ...other goals" (Ciro de Quadros, PAHO).
- Had vaccination coverage remained at the low levels of the 1970s, 120 million disability-adjusted life years (DALYs) would have been lost each year due to vaccine-preventable diseases (Janet de Merode, World Bank).
- [In this decade] there will be more changes in the routinely administered childhood vaccines than there have been in any other decade since vaccines were first discovered (David M. Salisbury, UK Department of Health).
- Vaccines are among the most complicated biological products to manufacture... New methods to characterize and control vaccines must be developed. (Elaine C. Esber, United States Food and Drug Administration).
- Smallpox was eradicated with vaccines which would not meet modern criteria for Good Manufacturing Practice (unattributed remark during discussion of global vaccine supply and quality control).

In closing the meeting, Prof Nossal presented the text of what was to be proclaimed "The Declaration of Kyoto". This, CVI's first "consensus document", was approved by the meeting. Among other things, it expressed concern "about the ability to sustain and expand these critically important efforts [to maintain and increase immunization coverage and achieve disease control goals] in the absence of substantial new strategic investments". It therefore called for "increased resources for vaccine research and development... rapid implementation of vaccine self-sufficiency programmes... [and measures to ensure] the safety and efficacy of vaccines". In its closing recommendation, the Declaration estimated that at least US$300 million will be needed over the next six years to "catalyse the priority activities [of the] CVI".

"Failure to maintain the political and social will demonstrated so far could jeopardize the global eradication of polio and impede ...other goals."

Gamma/Saboro Ohmori

Kayoko Hosokawa

Carr/Lee Siman

View of Kinkaku ji, Kyoto's Golden Pavilion

CVI WIRE

FROM UNICEF

• **UNICEF can help or hinder the development of new vaccines** depending on the type of procurement policy it pursues. This was the main conclusion of an analysis of the world vaccine market conducted by a management consulting firm at the request of UNICEF and presented to UNICEF officials in New York last January.

The study also found that if UNICEF – and the CVI as a whole – are to take full advantage of the latest advances in vaccine science and technology, they will have to establish a closer working relationship with vaccine manufacturers.

The main reason for commissioning the study, according to UNICEF/WHO technical officer Amie Batson, was the realization that "the rules of the game are changing". After years of stagnating or declining revenues, the world vaccine market, the study shows, is now burgeoning, thanks to a new generation of proprietary products, such as vaccines against *Haemophilus influenzae* type b, hepatitis B and hepatitis A. But the manufacturers that provide most of UNICEF's vaccine requirements, Ms Batson says, are having to reassess their prices and supply strategies in order to survive commercially in a market that is dominated, through acquisitions and mergers, by an ever-smaller number of ever-larger pharmaceutical firms.

UNICEF's traditional procurement strategy, with its focus on getting vaccines at the lowest price for as many countries as possible, has worked well, the study finds. But if its goals are to include the development of new vaccines that poor countries can afford, it will have to modify its procurement strategies to bring them more in line with the motivations and mechanisms of industry.

The study, which was carried out by the international firm Mercer Management Consulting, estimates current world demand for children's vaccines – BCG (against tuberculosis), DTP (diphtheria, tetanus and whooping cough), measles vaccine and oral polio vaccine – at 3.5 billion doses, a 60% increase over the 2 billion doses required a decade ago. This increase amounts to a 7% annual growth rate, driven almost entirely by the rising demand from developing countries. About 40% of this demand has been met through UNICEF, whose procurement volume rose by an average of 15% a year over the decade. The remaining 60% of children's vaccines are supplied through direct country-to-manufacturer procurement and local production, which rose by 10% a year.

Global revenue from vaccine sales, according to the analysis, amounts to US$3 billion a year, of which a third is accounted for by children's vaccines; another third, by proprietary (ie. patented) products and the remainder by vaccines for the adult market (eg. influenza vaccine).

UNICEF and the Pan American Health Organization (PAHO) purchase about half of the doses of children's vaccines produced by industry, but this accounts for only 5% of the industry's total vaccine revenue. The reason, according to the study, is that industry sells vaccines to UNICEF at a much lower price than that paid by many other customers. This price covers the marginal additional volume of vaccine for UNICEF, plus some of the overheads. If, however, UNICEF wishes to encourage manufacturers to invest in new vaccines, it will, the study recommends, have to:

- increase its understanding of manufacturers' commercial motivations, costing mechanisms and planning needs;
- target its procurement services to countries in greatest need of vaccine but too poor to pay prices that cover the true cost of production, leaving manufacturers to supply richer countries with vaccines priced at commercially viable levels;
- improve the ability of countries to forecast their vaccine needs more accurately and, through more reliable forecasting, to make long-term commitments to manufacturers;
- assess manufacturers on criteria other than price, such as capacity to provide new vaccines, reliability of supply and R & D capacity.

MEETING CALENDAR

6 May 1994
Brussels, Belgium

Belgian Immunological Society (BIS): Spring meeting: viral interferences in the immune system

P.L. Masson, Unité de Médecine Expérimentale, ICP/UCL, 7430 Avenue Hippocrate, 1200 Bruxelles, Belgium. Fax: (32-2) 764.74.30

9-10 May 1994
Rockville, MD, USA

12th annual biotechnology patent conference

ATCC/Workshop Manager, 12301 Parklawn Drive, Rockville, MD 20852, USA. Tel: (1-301) 231.55.66; Fax: (1-301) 770.18.05

14-18 May 1994
Buffalo, NY, USA

12th international convention immunology, transfusion immunology and medicine

Dr R. K. Cunningham, 449 Sherman Hall, SUNY at Buffalo, 3435 Main St., Buffalo, NY 14214-3078, USA. Tel: (1-716) 829.28.48; Fax: (1-716) 829.21.58

16-20 May 1994
Rockville, MD, USA

Recombinant DNA: techniques and applications

ATCC/Workshop Manager, 12301 Parklawn Drive, Rockville, MD 20852, USA. Tel: (1-301) 231.55.66; Fax: (1-301) 770.18.05

16-20 May 1994
Naples, Italy

Course on progress and perspectives in vaccination

Prof Serafino Zappacosta, Dipartimento di Biologia et Patologia Cellulare e Molecolare, Università di Napoli Federico II, Via Pansini 5, 80131 Napoli, Italy. Tel: (39-81) 746.30.57; Fax (39-81) 770.10.16

9-10 November 1994
Amsterdam, Netherlands

4th meeting of the CVI Consultative Group

Secretariat, Children's Vaccine Initiative, WHO/GPV, 1211 Geneva 27, Switzerland.

17-18 May 1994
Geneva, Switzerland

Genetic vaccines (naked DNA or RNA)

Dr M.-T. Aguado, Mircobiology and Immunology Support Services, WHO, Avenue Appia, 1211 Genève 27, Switzerland. Fax: (41-22) 788.29.37 or 791.07.46

18-20 May 1994
Brussels, Belgium

Combined vaccines for Europe: pharmaceutical, regulatory and policy-making aspects

EFPIA/EVN Secretariat, 250, Avenue Louise, B-1050 Bruxelles, Belgium. Tel: (32-2) 640.68.15; Fax: (32-2) 647-60.49

20-24 May 1994
Elsinore, Denmark

Macrophages in infection immunity

Dr J.M. Rhodes, Statens Seruminstitut, Artillerivej 5, 2300 Copenhagen S, Denmark.

25-28 May 1994
Taormina, Italy

2nd international meeting of the Society of Natural Immunity

Dr C. Riccardi, University of Rome 'La Sapienza', Dept of Experimental Medicine, Viale Regina Elena 324, 00161 Rome, Italy

7-10 June 1994
Nice, France

6th international antiviral symposium: clinical, pharmacological and basic aspects

Expand Connection, Elisabeth Negre, 53 rue de Paris, 92100 Boulogne, France

19-22 June 1994
Davos, Switzerland

8th international symposium on infections in the immunocompromised host

Warren C. Snow, P.O.Box 319, Comstock, MI 49041, USA

20-22 June 1994
Madrid, Spain

Resistance to viral infection

Instituto Juan March de Estudios e Investigaciones, Castelló 77, 28006 Madrid, Spain. Tel: (34-1) 435.42.40; Fax: (34-1) 576.34.20

21-24 June 1994
Rockville, MD, USA

ATCC workshop: hybridoma technology and monoclonal antibody product development

ATCC/Workshop Manager, 12301 Parklawn Drive, Rockville, MD 20852, USA. Tel: (1-301) 231.55.66; Fax: (1-301) 770.18.05

24 June – 5 July 1994
Cape Sounion Beach, Greece

Vaccines: new-generation immunological adjuvants

Prof Gregory Gregoriadis, Centre for Drug Delivery Research, The School of Pharmacy, University of London, 29-39 Brunswick Square, London WC1N 1AX, UK. Tel: (44-71) 753.58.22/58.20; Fax:(44-71) 753.58.20

30 June-1 July 1994
Glasgow, UK

Protective immunity in lymphatic filariasis

Dr E. Devaney, Dept of Veterinary Parasitology, University of Glasgow, Glasgow, G61 1QH, UK

3-8 July 1994
Prague, Czech Republic

7th international congress of the International Union of Microbiological Societies

IOMS Congresses '94, Institute of Microbiology, Videnska 1083, CS-142 20 Prague 4, Czech Republic. Fax: (42-2) 471.32.21

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4-8 July 1994
Brighton, UK

Biotechnology '94

Conferences & Courses Dept, IChemE, 165-171 Railway Terrace, Rugby, Warwickshire CV21 3HQ, UK

9-13 July 1994
Madison, WI, USA

13th scientific meeting of the American Society for Virology

Dr Ann Palmerberg, Dept of Veterinary Sciences, University of Wisconsin-Madison, 1655 Linden Drive, Madison, WI 53706, USA. Tel: (1-608) 262.75.19; Fax: (1-608) 262.74.20

13-17 July 1994
Montreal, Canada

Immunoglobulin gene expression in development and disease

Ms G. Busacco, Conference Department, The New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021, USA.
Tel: (1-212) 838.02.30;
Fax: (1-212) 838.56.40

14-18 August 1994
Stockholm, Sweden

Joint meeting of the European Group for Rapid Virus and the European Association against Virus Diseases

Dr H. Kangro, Secretary to the EGRVD, Dept of Virology, St Bartholomew's Hospital, West Smithfield, London EC1A 7BE, UK. Tel: (44-71) 601.73.52; Fax: (44-71) 726.42.48

3-6 September 1994
Le Bischenberg

European Science Foundation: therapeutic immunomodulation – tolerance induction in the adult, means and mechanisms

Centre d'Etudes et de Formation, 17, rue Raiffeisen, B.P. 79, Bischoffsheim 67210, Obernai, France.
Tel: (33) 88.76.71.35;
Fax: (33) 88.36.69.87

14 September 1994
London, UK

British Society for Parasitology autumn symposium: parasite vaccines

Dr H. Hurd, Centre for Applied Entomology and Parasitology, Dept of Biological Sciences, Keele University, Keele, ST5 5BG UK

5-9 October 1994
Cold Spring Harbor, NY, USA

Molecular approaches to the control of infectious diseases

Meetings Office, Cold Spring Harbor Laboratory, 1 Bungtown Road, Cold Spring Harbor, NY 11724-2213, USA.
Tel: (1-516) 367.83.16

12-17 October 1994
Montreal, Canada

7th international conference of comparative and applied virology

Prof Edouard Kurstek, Dept of Microbiology and Immunology, Faculty of Medicine, University of Montreal, P.O. Box 6128, Station A, Montreal, QC, H3C 317, Canada.
Tel: (1-514) 343.62.85;
Fax: (1-514) 343.57.01

21-25 October 1994
Orlando, FLA, USA

Receptor activation by antigens, cytokines, hormones and growth factors

Ms G. Busacco, Conference Department, The New York Academy of Sciences, 2 East 63rd Street, New York, NY 10021, USA.
Tel: (1-212) 838.02.30;
Fax: (1-212) 838.56.40

23-26 October 1994
Siena, Italy

Molecular mechanisms of microbial (bacterial and viral) pathogenesis, strategies of microbial attack, host response, immune response and prophylaxis

M. Rossini, Via Fiorentina, 1, 53100 Siena, Italy. Tel: (39-577) 293.483; Fax: (39-577) 293.564

2-4 November 1994
Langen, Germany

Replacement, reduction and refinement of animal experiments in the development and control of biological products

Dr K. Cussler, Paul-Ehrlich Institute, Paul-Ehrlich-Str. 51-59, P. O. Box 1740, D-63207 Langen, Germany.
Tel: (49-6103) 777.401;
Fax: (49-6103) 777.254

17-20 November 1994
Monte Carlo, Monaco

Advances in gene technology: molecular biology and human disease

Christine Jones, The Miami Bio/Technology European Symposium at Monaco, 4 Little Essex Street, London WC2R 3LF, UK. Tel: (44-71) 836-6633 x2593; Fax: (44-71) 379-5417

19-23 February 1995
Nice, France

7th European congress on biotechnology

Mrs L Cohen, Société de Chimie Industrielle, 28, rue St Dominique, 75007 Paris, France

New vaccine programme for WHO

WHO has created a new vaccine programme, called the Global Programme for Vaccines (GPV). Its Director is Dr Jong Wook Lee, who was formerly Director of Disease Prevention and Control in WHO's Manila office for the West Pacific Region. The new programme brings under its aegis the work of two originally separate programmes: the Expanded Programme on Immunization (EPI) and the Programme for Vaccine Development (PVD).

The GPV will also be responsible for the CVI secretariat. Dr Lindsay Martinez, formerly CVI Executive Secretary, has taken up another assignment with WHO's Division of Communicable Diseases. She sends good wishes to *CVI FORUM* readers and looks forward, in her new job, to continuing collaboration with many of her former CVI friends and colleagues.