



ICMR BULLETIN

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HIV INFECTION—ONGOING STUDIES AND FUTURE RESEARCH PLANS

AIDS was described as an obscure disease of unknown etiology in 1981. The next five years witnessed a rapid increase in the number of AIDS patients detected in USA and Africa. By 1985 it was obvious that AIDS had spread to Europe and Australia and had assumed the shape of a major global public health problem. However, no patient of AIDS was reported from Asia till 1985. Even today Asia, the most populous continent of the world has only 413 out of 1,77,950 patients of AIDS reported to WHO (WHO update - AIDS cases, September 1989). Asia appears to be the continent affected last and least by HIV infection. Hence, India and other Asian countries have, perhaps for the first time in the recorded history of mankind, been given the opportunity and challenge to contain and control a potentially lethal infection very early in the course of the epidemic.

Surveillance for HIV Infection

Phase I

Sound epidemiological data on prevalence of infection and mode of transmission are essential prerequisites for evolving logical intervention strategies for disease control. The Centre for Disease Control, Atlanta, USA was the first organisation that initiated the systematic epidemiological data collection of AIDS patients. Subsequently, several national registries for AIDS patients were started and by 1986 WHO organised

a global reporting system of AIDS patients. Almost all the available epidemiological data on AIDS are derived from studies on AIDS patients. However, this approach is not of much use in Asia where the number of patients reported are very low. Studies on the natural history of AIDS showed that a long asymptomatic period lasting for one to 10 years precedes the development of clinical symptoms of AIDS. Sensitive and specific tests for detection of asymptomatic HIV infection became available in 1985-86. Realising the potential threat posed by HIV infection and the urgent need for finding out whether the infection has reached India, the AIDS Task Force of the Indian Council of Medical Research (ICMR), New Delhi, recommended initiation of serosurveillance for HIV infection among asymptomatic persons belonging to high risk groups. The National Institute of Virology (NIV), Pune and the Christian Medical College (CMC), Vellore began the screening in October 1985. By April 1986, a total of 3027 persons from high risk groups were screened and 10 prostitutes were detected to be seropositive. The first patient of AIDS was detected by NIV, Pune in May 1986. On completion of Phase I of the serosurveillance it was clear that HIV infection had reached India.

Phase II

The AIDS Task Force of ICMR considered these findings and recommended that a national serosurveil-

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lance and clinical surveillance for HIV infection should be immediately initiated. The objective of this epidemiological study was to obtain information on prevalence and major mode of transmission of HIV infection; these data are essential for evolving strategies for control of HIV infection in India. The Task Force emphasised the need for immediate initiation of serosurveillance to gain time, because control measures initiated early in the epidemic when only a small proportion of population is infected are likely to be more effective in containment and control of infection.

Initiating a national clinical and serological surveillance for HIV infection in India was a major task. The existing health and laboratory personnel had to be familiarised and trained in the detection of clinical cases. Laboratory diagnosis and serosurveillance are expensive because of the cost of procurement of ELISA readers and kits. Hence, it was decided that the national surveillance would be established as a collaborative effort of ICMR, Directorate General of Health Services (DGHS), New Delhi and State Health Authorities. A network of five reference centres and 43 surveillance centres were established in six months within the existing health infrastructure employing minimum essential additional inputs (Fig). The second phase of serosurveillance began in May 1986. Initially the emphasis was on screening of prostitutes. Screening of a relatively small number of these women revealed that HIV infection existed in different parts of India. Subsequently, a wider coverage of

all the known risk groups was attempted. Some of the landmarks in the serosurveillance for HIV infection are given in Table I. By the end of 1986 it became obvious that heterosexual promiscuity played a major role in the transmission of HIV infection. During the second phase (which ended in October 1987) 53,907 persons were screened, 135 individuals were found to be seropositive and 14 patients of AIDS were detected. It was obvious that seropositivity rate even among high risk groups was quite low. Consequent to finding seropositives among pregnant women, infants, blood donors and blood recipients during this phase, the ICMR Task Force recommended that in the third phase of serosurveillance, blood donors, and mother-infant dyad should be included in addition to the high risk groups.

The second phase of serosurveillance demonstrated that even in a developing country with limited resources where very few AIDS patients existed, it is possible to organise a national clinical and serosurveillance programme through the existing hospital and laboratory infrastructure with minimum essential additional inputs. With the information obtained from such surveillance, appropriate intervention programmes including preparation of appropriate health education material for prevention of infection could be initiated. The data from the study also provided the policy makers an idea about the extent and nature of future activities and the resource allocation needed for these.

Table I. Landmarks in the National HIV Serosurveillance Programme

Period	First Detection	Steps Taken
April, 1986	Seropositive Indian (prostitute)	National clinical and serosurveillance programme for HIV infection established.
May, 1986	AIDS patient in India	
August, 1986	Seropositive Indian male (STD clinic)	Screening in STD clinics intensified.
September, 1986	Seropositive pregnant woman	Screening of pregnant women initiated.
December, 1986	Patient of AIDS in homosexuals	Screening of homosexuals and jail inmates (men) attempted.
July, 1987	Seropositive Indian blood donor	Screening of blood donors and blood recipients augmented.
	Seropositive blood recipient (from Indian donor)	
	Spouse to Spouse transmission	Efforts for contact tracing intensified.
October, 1987	Seropositive infant	Antenatal screening intensified.



AIDS Reference and Surveillance Centres and Centre for AIDS Research & Control.

Phase III A

The first part of the third phase of serosurveillance began in November 1987 and lasted till October 31, 1988. During this period 1,09,632 persons from high risk groups were screened and 387 seropositive individuals including 11 AIDS patients were detected. There was a steep rise in screening activities during this period not only among high risk groups but also among blood donors and pregnant women. The overall seropositivity rate continued to be low (3.8/1000), but it was obvious that there was an increase in seropositivity rate among blood donors and promiscuous men (Table II).

The ICMR Expert Group reviewed these findings and recommended that:-

- (i) Blood donor screening for HIV infection may be initiated in a phase manner starting with the four major metropolitan cities.
- (ii) Health education of vulnerable and high risk groups should receive adequate attention.
- (iii) Clinical facilities for counselling and care of seropositive individuals needed to be established.
- (iv) Hospital policies for care of HIV infected persons including AIDS patients should be drawn up.

Table II. Trends in seropositivity rates in selected groups

	Period					
	October, 85 to April, 86	May, 86 to October, 86	November, 86 to April, 87	May, 87 to October, 87	November, 87 to April, 88	May, 88 to October, 88
PROMISCUOUS MALES						
Number tested	1072	3000	852	7212	7105	5967
Number positive	0	1	2	17	53	53
Rate per 1,000	0	0.3	2.3	2.4	7.5	8.9
Cumulative rate/1,000	0	0.2	0.7	1.6	3.8	5.0
PROMISCUOUS FEMALES						
Number tested	306	680	2863	7491	3375	3752
Number positive	0	3	4	7	14	20
Rate per 1,000	0	4.4	1.4	0.9	4.1	5.3
Cumulative rate/1,000	0	3.3	1.8	1.2	1.9	2.5
BLOOD DONORS						
Number tested	872	2184	2340	5137	4413	12795
Number positive	0	0	0	1	3	37
Rate per 1,000	0	0	0	0.2	0.7	2.9
Cumulative rate/1,000	0	0	0	0.1	0.3	1.5

- (v) Diagnostic facilities for HIV antibody detection should be made available in more centres.
- (vi) Systematic sentinel surveillance for HIV infection should be initiated.

Responding to these recommendations, the DGHS drew up the medium term plan for AIDS control with the following major objectives:-

- (i) Reduction and later prevention in sexual, perinatal and parenteral transmission of HIV infection.
- (ii) Reduction in morbidity associated with HIV infection through early detection, prompt and adequate treatment of seropositive individuals.
- (iii) Minimise social and economic impact of HIV infection by timely intervention measures. As a part of the medium term plan the DGHS also drew up an action plan for blood donor screening for HIV infection in India.

Phase III B

The second part of the third phase started in November 1988 and is continuing. On the advice of the ICMR Expert Group all the surveillance/reference centres intensified screening of blood donors. In January 1989, the DGHS requested all the reference/surveillance centres to assist in initiating the first phase of the blood donor screening programme by taking up training of personnel from the newer centres and screening sera sent by blood banks for HIV antibodies.

In January 1989, HIV antibodies were detected in a blood product manufactured in India. The DGHS and Drugs Controller of India (DCI) requested the ICMR

and the surveillance/reference centres for assistance in testing blood products as well as blood product recipients. This additional work was also taken up by the Council and the centres. Thus during the period from November 1988 to October 1989, the major attention of the surveillance/reference centres was on providing assistance to the service programmes for screening of blood donors, blood products and blood product recipients. Because of this sudden increase in the work load, serosurveillance and screening of high risk groups had to be curtailed in many centres. The ICMR postponed initiation of the proposed sentinel surveillance for HIV infection.

Profile of Seropositive Individuals

From the inception of the programme till October 31, 1989 the centres have screened 3,64,277 persons from various groups; 1650 of these have been found to be seropositive; 40 patients of AIDS have so far been reported to ICMR by the centres (Table III & IV).

Promiscuous men and women form the single largest group of seropositive individuals. Undoubtedly heterosexual promiscuity plays a major role in transmission of HIV infection in India. Contact tracing and follow up of families of seropositive persons have been stepped up. This has facilitated detection of infections in the asymptomatic phase transmitted perinatally/spouse-to-spouse.

Blood donors are the second largest group of seropositive individuals detected. This is mainly because the blood donors (or more correctly donated blood) form the single largest group screened. And partly, because seropositive professional donors have donated blood repeatedly under different names, in various blood

**Table III. Serosurveillance for HIV infection
(October, 1985 to October, 1989)**

		No. screened	No. sero- positive	Rate per, 1,000	AIDS patients
Phase I	(October, 1985-April, 1986)	3027	10	3.3	0
Phase II	(May, 1986-October, 1987)	53,907	135	2.5	14
Phase III A	(November, 1987-October, 1988)	1,09,632	387	3.5	11
Phase III B	(November, 1989-October, 1989)*	1,97,711	1,118	5.6	15
Total		3,64,277	1,650	4.5	40

*Data do not include blood donors screened after April 1989.

banks/cities. Following the detection of HIV antibodies in blood products, some of the centres undertook screening of professional blood donors who had been donating blood for manufacture of blood products. The seropositivity rate among these was very high and thus this group also contributed to the relatively large number of seropositive blood donors reported so far. With increasing awareness about the possibility of transmission of HIV

infection through blood and blood products, voluntary screening among blood product recipients has gone up and large number of seropositive recipients are being identified. Some, who were detected to be seropositive in one centre sought testing in other centres without revealing that they had been tested earlier. Thus, in this group also some duplication exists among number of reported seropositive individuals.

Table IV. Serosurveillance for HIV infection
(Period of reporting: from inception to October 31, 1989)

Institution	Number Screened (364277)	Number positive	
		ELISA (2043)	Western Blot (1650)
Institute of Preventive Medicine, Hyderabad, A P.	225	0	0
Osmania Medical College, Hyderabad, A P.	291	1	1
S.V. Medical College, Tirupati, A P.	2986	17	13
Andhra Medical College, Visakhapatnam, A P.	4074	0	0
Rajendra Memorial Research Institute for Medical Sciences, Patna, Bihar.	2933	0	0
Postgraduate Institute of Medical Education & Research, Chandigarh.	8210	41	41
All India Institute of Medical Sciences (M), New Delhi; *	17967	34	29
All India Institute of Medical Sciences (S), New Delhi.*	5601	55	51
Maulana Azad Medical College, New Delhi.	4521	4	4
National Institute of Communicable Diseases, Delhi.*	11391	14	9
Institute of Cytology and Preventive Oncology, New Delhi.	227	0	0
Armed Forces Transfusion Centre, Delhi.	97	8	0
Institute of Pathology, New Delhi.	665	0	0
Goa Medical College, Panaji, Goa.	11551	43	23
B.J. Medical College, Ahmedabad, Gujarat.	11733	9	9
Medical College, Rohtak, Haryana.	13976	3	2
I.G. Medical College, Shimla, H P.	1318	1	1
Institute of Medical Sciences, Srinagar, J&K.	2906	2	2
Bangalore Medical College, Bangalore, Karnataka.	16821	21	15
S.A.T. Medical College, Trivandrum, Kerala.	3111	9	9
Gandhi Medical College, Bhopal, M P.	3404	15	6
Choithram Hospital and Research Centre, Indore, M P.	885	3	3
Regional Medical Research Centre, Jabalpur, M P.	2632	16	16
Grant Medical College, Bombay, Maharashtra.	13115	193	30
Institute of Immunohaematology, Bombay, Maharashtra.	10678	174	93
Seth G.S. Medical College, Bombay, Maharashtra.	8724	233	145
Government Medical College, Nagpur, Maharashtra.	4512	23	2

*Reference Centre

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Table IV Contd.....

Institution	Number Screened	Number positive	
		ELISA	Western Blot
Armed Forces Medical College, Pune, Maharashtra.	2924	6	3
National Institute of Virology, Pune, Maharashtra.*	13337	134	109
Regional Medical College, Imphal, Manipur.	2392	1	0
S.C.B. Medical College, Cuttack, Orissa.	2285	0	0
Regional Medical Research Centre, Bhubaneswar, Orissa.	1166	0	0
Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry.	6554	96	64
S.M.S. Medical College, Jaipur, Rajasthan.	1109	0	0
Apollo Hospital, Madras, T N.	22774	15	15
Madras Medical College, Madras, T N.	59490	308	253
Institute of Child Health and Hospital for Children, Madras, T N.	6689	25	21
Government Royapettahi Hospital, Madras, T N.	200	0	0
Stanley Medical College, Madras, T N.	869	0	0
Madurai Medical College, Madurai, T N.	14816	176	156
Christian Medical College, Vellore, T N.*	54587	289	212
Central Jalma Institute for Leprosy, Agra, U P.	966	1	1
King George Medical College, Lucknow, U P.	2450	5	3
Institute of Medical Sciences, Varanasi, U P.	2010	0	0
National Institute of Cholera and Enteric Diseases, West Bengal.	1145	1	1
School of Tropical Medicine, Calcutta, West Bengal.	3960	4	3
Sera sent to reference centres for confirmation	21347	1517	1240

*Reference Centre

Data of blood donors screened after April 1989 have not been included.

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Training and orientation sessions organised by various agencies have augmented the awareness and sharpened the diagnostic skills of clinicians. This has helped in diagnosis of AIDS patients on the basis of clinical criteria, the diagnosis being later confirmed by serological testing. Foreigners (including students and tourists) form another group of seropositives. Most of them have already been repatriated (Table V).

AIDS Patients in India

Clinical surveillance for HIV infection was initiated along with serosurveillance in October 1985. The first

patient of AIDS was reported in May, 1986 by NIV, Pune. The source of infection was traced to blood transfusion given in USA, where the patient had gone for coronary bypass surgery. The second patient was reported a month later. He was a haemophiliac who had received Factor VIII infusion in USA. Till October 31, 1989, number of AIDS patients reported to ICMR was 40. Of these, 12 were foreigners; five of them died in India, the rest were deported. All the 28 Indians have succumbed to the disease. Available data suggest that most of the Indians had acquired the infection mainly through heterosexual promiscuity either in India or abroad. One of them was the wife of an AIDS patient—the first documented spouse-to-spouse transmission of HIV infection in India.

Table V. Profile of seropositive individuals detected in India

	Male	Female	Total
Indians			
Heterosexually promiscuous	364	568	932
Homosexuals	2	—	2
Blood donors (up to April, 1989 only)	386	15	401
Patients on dialysis	2	0	2
Pregnant mothers	—	7	7
Recipients of blood/blood products	40	4	44
Relatives of AIDS patients	9	13	22
Suspected ARC/AIDS patients	25	8	33
Others	88	18	106
sub total	916	633	1549
Foreigners			
Students	50	11	61
Others	29	11	40
sub total	79	22	101
Total	995	655	1650

During 1988, five Indians with AIDS appeared to have acquired the infection in India (two prostitutes, one promiscuous man, a wife of an AIDS patient, and a transfusion recipient). By October 1989, eight more AIDS patients among Indians who had never been abroad have been reported. These included 3 prostitutes (one who was detected to be seropositive since 1987), 4 promiscuous men, and wife of an asymptomatic promiscuous man who was HIV seropositive (Table VI).

Almost all patients presented with weight loss, fever, diarrhoea, repeated respiratory and skin infections. Oropharyngeal candidiasis was detected in 32 patients; neurological/psychiatric manifestations including cryptococcal meningitis and encephalitis was noted in 15 patients. Extensive disseminated tuberculosis was seen in 2 patients. In one of these post mortem examination revealed widely disseminated tuberculosis of the lung, liver, spleen, kidney and lymphnodes. Kaposi's sarcoma was seen in 2 foreigners (an American and a

Kenyan). To date none of the Indian patients have had Kaposi's sarcoma.

The Union Ministry of Health, the DGHS and the State Health Authorities have initiated the necessary steps to strengthen existing health care facilities, especially the Department of Internal Medicine and Sexually Transmitted Diseases Clinics, so that adequate health care for seropositive individuals and AIDS patients could be provided in some major cities in India.

Table VI. AIDS patients detected in India (till October 31, 1989)

	Male	Female	Total
Indians	21	7	28
Foreigners	9	3	12
Total	30	10	40

Probable source of infection in Indians:	In India	Abroad
Heterosexual promiscuity	10	12
Blood transfusion	1	1
Blood products infusion	0	1
Homosexual contact	0	1
Spouse of an AIDS patient/seropositive person	2	0

Screening of Blood Donors

HIV is the latest addition to the list of blood transfusion transmitted diseases. The very first patient of AIDS reported from India was a person who had been infected through multiple blood transfusions given during coronary bypass surgery in the USA. From the start all surveillance centres have been screening blood donors—especially professional donors for HIV antibodies. The first seropositive blood donor was detected in July 1987 in Vellore. Intensification of serosurveillance among blood donors especially in Tamil Nadu led to the detection of four more seropositive donors in the state by the end of 1987. During the first half of 1988 seropositive blood donors were detected in several towns and cities in Maharashtra and Tamil Nadu. The AIDS Task Force reviewed these findings in May 1988 and recommended that all the centres may be advised to intensify screening of donated blood and in some



selected centres screening of all blood donors may be initiated. The Group also suggested that data so generated may be reviewed by the end of 1988. Screening of all blood donors was initiated in some institutions in Vellore, Madras, Pune, Bombay and Delhi in June 1988. The ICMR Expert Group reviewed the data from serosurveillance among blood donors in November 1988 and noted that there was a progressive increase in the seropositivity rate among donors; though overall seropositivity rate was still only 1.5/1000 (Table II). The Group recommended that an attempt should be made to ensure safety of blood used for transfusions in India by screening of all donated blood for HIV antibodies. It was suggested that the programme may start in major metropolitan cities where large number of transfusions are given and later may be expanded to cover the entire country in a phased manner.

In December 1988, the DGHS in collaboration with the ICMR and the State Health Authorities drew up the action plan for blood donor screening for HIV antibodies. In the first phase, screening of donated blood was to be initiated in the four major metropolitan cities by linking all existent blood banks to selected centres where facilities for detection of HIV antibodies were available. The existing surveillance centres were requested to assist in the blood donor screening programme in the cities in which they are located. The action plan envisaged progressive expansion of the screening centres in a phased manner over the next few years so that all the donated blood in India is screened for HIV antibodies (Table VII). In January 1989, the nodal state government persons responsible for the screening programme in Delhi, Bombay, Madras and Calcutta were identified. They established specific linkages between screening centres and blood banks in the city. The blood banks are required to send daily the sera from blood donations to the testing centres. The centres do the ELISA testing and inform the blood banks immediately if any sample is found ELISA positive. The blood banks then take steps to ensure safe disposal of the ELISA positive blood.

In order to ensure that the blood donor screening programme starts without delay, the ICMR was requested to assist the DGHS in the initial phase by use of the established systems and network of HIV serosurveillance programme in (i) import of ELISA readers, kits and other essential items for the programme; (ii) storage and distribution of kits and readers to depot and screening centres; and (iii) training of personnel in the screening centres.

Table VII. Action plan for blood donor screening

Strategy:	LINK BLOOD BANKS TO HIV TESTING CENTRES.
Phase I:	Metropolitan cities.
Phase II:	State capitals, cities with population of 1 million or more.
Phase III:	Cities with population of 0.5 million or more.
Responsibilities:	
DGHS:	Drawing up phased programme, funding, supply of kits, readers, quality control, monitoring and evaluation.
States:	Organise linkages, implement donor screening, quality control, reporting on activities.
ICMR:	Technical help, training, review data, quality control, look after reader and kit supply (until DGHS is geared to take up the job).
Current Status (till October 31, 1989):	
No. Screened:	2,17,428
ELISA positive:	2474

The surveillance and reference centres started screening sera sent by blood banks from January 1989. By April 1989 most of the centres have complied with the request and so ICMR advised that the data on screening of donated blood should be reported separately. According to the reports received by the ICMR during the period from April 1, 1989 to October 31, 1989, a total of 2,17,428 samples of donated blood have been screened; of these 2474 were ELISA positive. Thus the programme has substantially helped in ensuring the safety of transfused blood in the country.

The data from the blood donor screening programme, however, cannot be used for computing the seropositivity rate among blood donors in the country because of two reasons. The sera are screened by ELISA test and are not routinely subjected to confirmatory Western Blot testing; some of the ELISA positives may not be positive by Western Blot. Attempts to follow up seropositive donors brought to light the fact that professional donors, often donated blood several times within three months in different blood banks, under different names giving untraceable addresses and do not inform the blood banks about their earlier donations. The data from screening of blood thus pertains not to the number of persons screened but the number of blood donations screened. The ICMR is about to initiate a sentinel surveillance for HIV infection among blood donors which will provide information on time trends in seropositivity rate among blood donors.

In India it is estimated that about 1.5 million bottles of blood are collected every year and the amount is expected to increase. Organising screening of all these samples of blood for HIV antibodies is a major and expensive undertaking. Computations based on available global data suggested that only 4 per cent of HIV transmission is due to blood/blood products infusion. The question is, therefore, asked whether the effort, time and money spent on donor screening is in fact worth the while? Blood donor screening is being taken up because of the following reasons:

- (i) Blood/blood product infusion is one of the most efficient means of transmission of HIV infection (estimated transmission rates — blood transfusion: 90%, perinatal transmission: 30-50%; sexual transmission: 1 in 1000).
- (ii) Prevention of iatrogenic infection is an essential ethical requirement.
- (iii) Demonstration that the medical profession has put in all its efforts to prevent this mode of transmission, may stimulate all other segments of population to put in the necessary efforts to achieve HIV containment and prevention of AIDS.

Alongwith screening of blood for HIV antibodies, the Government of India is initiating steps to modernise blood banking services in the country so that adequate quantity of safe blood/blood products are available for meeting the demand. Steps are also being taken to educate the general public and professionals that transfusion should only be done where absolutely needed.

Screening of Blood/Blood Products Recipients

Individuals such as thalassemic children and haemophiliacs receiving repeated blood transfusions and blood products infusions have been recognised as a group at risk of getting HIV infection through infected blood or blood products. The second patient of AIDS detected in India in 1986 was a haemophiliac who had received Factor VIII infusion abroad. The surveillance/reference centres have been screening such high risk blood/blood products recipients. Several of these individuals have also sought testing for HIV antibodies by themselves. In fact, several had approached more than one centre for testing without divulging their earlier test results. Till October 31, 1989, the surveillance/reference centres have reported that 44 blood/blood products recipients were found to be seropositive. It is, however, difficult to assess the seropositivity rate among blood product recipients because of the problems in checking and eliminating duplication in reporting. Testing centres have taken all the steps to ensure confidentiality and to

provide adequate counselling, health education and care for these seropositive individuals. Even as early as 1986 the Government of India had made it mandatory that all imported blood products should carry an AIDS-free certificate. The DCI has subsequently issued necessary guidelines to ensure that products manufactured in India are free from HIV contamination. With these measures and initiation of routine blood donor screening for HIV antibodies in major cities in India it is expected that no new case of blood/blood products transmitted HIV infection will be encountered in future.

In January 1989, one of the reference centres detected HIV antibodies in a blood product (anti D immunoglobulin) manufactured in India. The DCI immediately ordered cessation of production of all indigenously manufactured blood products. Instructions were also issued to ensure that all blood products are withdrawn from the market. At DCI's request, reference centres and some of surveillance centres started testing blood products for presence of HIV antibodies. Data from these studies indicated that HIV antibodies were present in some blood products. Some individuals who had donated blood earlier for manufacture of blood products were also tested and were found to be seropositive. The DCI thereafter had issued necessary instructions to ensure safety and availability of blood products (Table VIII). At the request of the DGHS the surveillance/reference centres screened persons who had received immunoglobulins during the last two years. Till June 1989 a total of 503 individuals, who had received immunoglobulins were tested and none were found to be seropositive.

Table VIII. HIV antibodies in blood products

January, 1989 :	Detection of HIV antibodies in anti D immunoglobulin.
February, 1989 :	DCI stops production and withdraws all stocks of blood products (BP). DCI sends samples of products to reference/surveillance centres for testing.
March, 1989 :	Centres report detection of antibody to HIV in several samples. Donors donating blood for BP found seropositive.
April, 1989 :	DCI liberalises import of BP. DCI issues guidelines for BP manufacture. DGHS requests blood product recipients to undergo HIV test.
April-June, 1989 :	503 recipients tested; None found seropositive.

MCH Problems in HIV Infection

Reports from the WHO indicate that about 1.5 million of the estimated 5 million HIV infected individuals in the world are women. About 1 million of these women live in Africa. It has been estimated that till now about 80,000 infants have been found to be infected at birth and 40,000 of these will not live to see their second birthday.

Available data from serosurveillance for HIV infection in India show that heterosexual promiscuity is the major mode of transmission of infection in India. In our country contraceptive use is quite low and birth rate continues to be high. It is, therefore, hardly surprising, that right in 1986, pregnancies among seropositive women were reported. The first pregnancy was detected in a prostitute who was earlier detected to be seropositive. The second pregnancy was detected during contact tracing of a promiscuous seropositive man. Follow up of these women and their offsprings had shown that some of the infants were infected. The serosurveillance of women attending antenatal clinics was initiated in 1986 and further strengthened and intensified in 1987. Reported seropositivity rate among pregnant women attending antenatal clinics is quite low (1/1000 or lower). Efforts are underway to initiate sentinel surveillance among pregnant women attending antenatal clinics so that data on time trends in seropositivity rate in these women in different regions could be obtained and as and when needed appropriate intervention programmes could be initiated.

Though it is possible that HIV testing could be undertaken in recognised high risk groups, it is impossible to screen all pregnant women for HIV infection. So a substantial proportion of seropositive pregnancies will continue to remain undetected. Two major questions confronting health care personnel under these circumstances are: (i) the advice and care to be given to seropositive women and (ii) whether there is a need to change the current MCH care policies because of the advent of HIV infection?

Pregnancies in seropositive women are a matter of concern because there is a 30 to 50 per cent chance that the infant born to a seropositive mother is infected at birth; 50 per cent of infected infants will die of AIDS before the age of two. It is therefore essential that as a part of counselling and care, efforts are made to provide adequate contraceptive care to all seropositive women. If pregnancy is detected early and the woman has completed her family, medical termination of pregnancy with concurrent contraception might be an appropriate

option. Pregnant seropositive women who want to continue their pregnancies require adequate antenatal and intrapartum care. Precautions need be taken to ensure that accidental HIV infection does not occur during antenatal or intrapartum care.

Transmission of HIV through breast milk is very rare; breast feeding is essential for infant survival and growth in developing countries like India; in an infected infant, breast feeding may play a crucial role in prolonging the survival. It is therefore, essential to ensure that all seropositive mothers breast feed their infants irrespective of the HIV status of the infant.

During the first year of life it is difficult to find out whether the infant is infected; because of transplacental transfer of antibodies even uninfected infants are ELISA and Western Blot positive. Persistence of antibodies beyond the first year, demonstration of viral antigens, virus isolation and development of clinical symptoms of paediatrics AIDS are suggestive of HIV infection.

Available data suggest that the risks and known consequences of natural infection in infants are likely to be graver than the risks associated with vaccination even with live attenuated vaccines. Taking all these factors into consideration WHO has recommended that:

- (i) All asymptomatic HIV infected infants should receive all standard vaccines — both live and inactivated.
- (ii) Those with symptoms of ARC/AIDS should not receive BCG, but measles, OPV and all inactivated vaccines should be given.
- (iii) Inactivated polio vaccine may be used as an alternative to live vaccines in children with ARC/AIDS.

Advent of HIV infection in the community should act as yet another stimulant to the efforts to provide optimal MCH care. Providing appropriate contraceptive care to all eligible women would substantially reduce birth of infected infants. It is essential that all aseptic precautions are meticulously adhered to during provision of antenatal, intrapartum and contraceptive care so that accidental HIV infection is prevented. Breast feeding is the best form of infant feeding and is to be encouraged as the method of ensuring infant survival and growth and birth spacing. Irrespective of the HIV infection status (known or unknown) all apparently healthy infants should continue to receive immunisation against the six major vaccine preventable diseases. Thus, the advent of HIV infection and the presence of undetected HIV infected pregnant women and infants in the com-

munity only serve to emphasise the need to provide optimum MCH care and does not in any way require major modification in guidelines for provision of MCH services.

Follow up of Seropositive Individuals

At present, there is very little information available on the natural history of HIV infection in India. Efforts are underway to follow up all seropositive individuals systematically. Apart from clinical examination, virological and immunological studies are being planned and carried out.

There have been reports that prevalence of tuberculosis and gastrointestinal infections might be increased in seropositive individuals. Investigations on prevalence of these infections in seropositive individuals and seropositivity rate in persons with these infections are underway to determine the magnitude of the association, so that appropriate intervention strategies could be initiated in seropositive individuals.

There is an urgent need to document the clinical course of HIV infection in India. Apparently the pattern of infections in these immuno-compromised individuals in India would include not only opportunistic infections but also common pathogenic infections such as tuberculosis and amoebiasis. Two centres had reported that suspected cases of AIDS—one with disseminated tuberculosis and other with amoebic liver abscess responded well to standard chemotherapeutic regimens and gained weight. They are currently asymptomatic and their T4/T8 ratio has come back to near normalcy. If confirmed in larger series the above findings may have major relevance to the management of AIDS patients in India.

Available data suggest that there may be marked differences in the type of opportunistic infections in AIDS patients in developing countries. Efforts are underway to build up facilities to investigate and document the pattern of opportunistic infections in seropositive individuals, so that these infections could be diagnosed and treated appropriately.

With the intensification of the serosurveillance activity, increasing number of seropositive individuals are being detected. Efforts are being made by all the centres to follow up all seropositive persons, provide them with essential health education and appropriate health care, as and when needed. Because of the social stigma associated with the disease and the lack of curative therapy, all seropositive individuals require psychological support and counselling. A centre for counselling

seropositive persons has been functioning in CMC, Vellore, for nearly two years, and has provided valuable insights into the psychosocial problems of seropositive individuals. Several surveillance centres have established functional linkages with the psychologists/psychiatrists in the medical colleges and have been providing the necessary counselling for seropositive individuals.

Hospital Policies on Care of HIV Seropositive Persons

Although seropositive individuals may remain asymptomatic for periods as long as ten years, most of them may require health care during this period. There is an urgent need to draw up hospital policies for care of seropositive individuals. Humane sympathetic care of seropositive individuals should be ensured without incurring any risk of accidental spread of HIV infection. A beginning in this direction has been made by the All India Institute of Medical Sciences (AIIMS), New Delhi; CMC, Vellore and Postgraduate Institute of Medical Education and Research, Chandigarh. The Council is assisting the health services in evolving suitable national guidelines for care of HIV infected persons in India. These will have to be widely disseminated among health service personnel and implemented through the health care system.

Prevention of Accidental Infection

Ample data exist to indicate that HIV infection could be transmitted through contaminated syringes and needles. This factor is in fact, responsible for most of the cases of HIV infection in intravenous drug addicts. In India fortunately intravenous drug addiction does not appear to be very common. Among a small number of intravenous drug addicts screened, none were found to be seropositive. However, there might be a risk of transmission of HIV infection due to improper sterilisation of syringes and needles. Apart from medical and paramedical persons, practitioners of various indigenous system of medicine and even quacks are known to administer parenteral injections. There is an urgent need, therefore to educate the general public and all those who provide parenteral therapy regarding the necessity of ensuring proper sterilisation of syringes and needles to prevent transmission of infections including HIV.

Three categories of HIV infected persons are likely to seek health care. The smallest of these are persons with symptoms suggestive of AIDS who need medical aid. It is relatively easy to ensure that proper precautions are taken to prevent accidental spread of HIV infection from individuals with clinical symptoms because they are small in number and could be recognised readily.

The larger group consists of seropositive individuals who are not suffering from AIDS but seek health care for other ailments or prophylactic measures. If proper follow up care and counselling services are built in as an integral part of the HIV antibody screening services, it may not be difficult to ensure that the necessary precautions are taken while providing health care to this category of persons also.

Asymptomatic HIV infected persons who have never been tested for HIV antibodies (and are consequently not aware that they are infected), with unrelated health problems, are likely to form by far, the largest group of infected persons seeking health care. To ensure that accidental contamination does not occur from these as yet unrecognised seropositive individuals, the entire range of health service activities regarding asepsis, sterilisation and disposal of soiled articles need be streamlined and strengthened. It is essential that clear cut guidelines are provided to medical, paramedical and laboratory persons so as to ensure humane and sympathetic handling of persons seeking health care and at the same time preventing accidental spread of infection. The Council continues to provide assistance to health services in evolving guidelines suitable for Indian conditions, to prevent accidental infection.

HIV 2 Infection

Two types of HIV infections *viz* HIV 1 and HIV 2 have been described. There had been speculations whether the asymptomatic period and severity of clinical course might be different in HIV 2 infections. Specific kits for detection of HIV 2 infection became commercially available in 1988. Studies carried out in the reference centres using the first lot of commercially available kits showed that these kits lacked specificity and there was a great deal of cross reactions with HIV 1. The second lot which were tested in early 1989 were also not satisfactory. Because of this, the question whether HIV 2 infection exists in India and if so, the magnitude of HIV 2 infection remains unanswered. During 1989 newer HIV 2 kits and combined HIV 1 and HIV 2 kits have been marketed. As soon as a sufficiently sensitive and specific kit becomes available, surveillance for HIV 2 infection will be taken up.

Surveillance for Hepatitis B Infection

The ICMR Task Force on AIDS had recommended that as and when possible, serosurveillance of some common infections like hepatitis B and syphilis should be carried out along with the ongoing serosurveillance for HIV infections. The surveillance centres were encour-

aged to screen the sera for hepatitis B using whatever kit they were currently using for detection of HBsAg in the centres. In addition, the Council provided HBsAg ELISA kits to four of the five reference centres to screen a panel of 1500 sera from high risk groups. Preliminary results from CMC, Vellore, indicate that HBsAg is present in about 3 per cent of voluntary blood donor and 10 per cent of promiscuous men and women. Prevalance of HIV antibodies in these groups was 1.5/1000 and 4/1000 respectively. It is expected that the study will provide some useful preliminary data on prevalence of HIV and HBV infection in different groups in different regions of India. If funds are made available for procuring sensitive specific kits for HBsAg detection and for serological diagnosis of sexually transmitted diseases, the sera collected during the proposed sentinel surveillance for HIV infection could be tested for some of the STD and hepatitis B infection. The study would provide valuable regional, group-wise data on prevalence of these infections, based on which effective specific intervention strategies could be devised and implemented.

Evaluation of Immunodiagnostic Kits

It is expected that the serosurveillance programme will continue to expand. There is a felt need for HIV screening as a part of the service programme in blood banks and antenatal clinics. There might also be increase in demands for diagnostic HIV tests for suspected ARC/AIDS patients. The prohibitive cost of the testing is one of the major constraints that limit wider availability and use of HIV diagnostic tests. During the last two years, several newer immunodiagnostic tests have been developed, some of which are reported to be more sensitive and specific. Some of the newer tests are visual assays and do not require an ELISA reader. The newer kits are periodically evaluated by the reference centres, so that a test that is most suitable and economical under existing conditions in India could be chosen for use in the serosurveillance network.

In view of the increasing demand for HIV screening in India, there is an urgent need to explore feasibility of bringing down the cost of kits by indigenous manufacture. At the request of the Ministry of Health and Family Welfare and the Department of Biotechnology (DBT), the ICMR had undertaken evaluation of some of the commercially available immunodiagnostic tests for HIV antibody detection, with the objective of selecting the suitable kit/kits for indigenous production. The reference centres completed the evaluation of nine kits chosen for evaluation by DBT in June 1989. Of

these, 3 were found to be suitable on the basis of sensitivity and specificity. Neither of the two visual assays tested were sensitive and specific enough for use in screening programmes. The results of the evaluation have been communicated to DBT; it is expected that DBT will soon be initiating the necessary steps regarding manufacture of kits in India.

Virus Isolation

Facilities for isolation of HIV from seropositive individuals and AIDS patients are being created in the reference centres for AIDS. Personnel from these laboratories have been sent abroad for training. The necessary kits, chemicals, glass-ware and equipments have been imported and supplied to 3 of the reference centres. ICMR has provided grants for setting up a P₃ facility at the AIIMS, New Delhi. P₂ facilities are available at the NIV, Pune and the CMC, Vellore.

Two of the reference centres *viz* AIIMS, New Delhi and NIV, Pune have reported successful isolation of HIV from seropositive individuals and AIDS patients. This is the first step towards characterisation of the causative organism. During the last two years, researchers abroad have reported marked variations in antigens of the envelope protein of HIV isolated from different persons and from different regions. Antigenic variations in envelope protein may pose problems in terms of effective vaccine development and use against HIV. Establishment of facilities for undertaking virus isolation and characterisation of virus in India is an important step in this context.

Infrastructure and Manpower Development

A phased inservice training programme for scientists in the field of virology, immunology and epidemiology of HIV infection and training of health services personnel in the care of seropositive individuals and AIDS patients is being carried out. Linkages are being established between surveillance, research and health service infrastructures, so that optimal use of available expertise and facilities for management of seropositive individuals could be built up.

It is now well recognised that seropositive individuals encounter legal, social as well as economic problems. HIV infection may thus have a profound impact on demographic and economic profiles especially in developing countries. Close interagency linkages and collaboration are being sought and maintained by the health services, in order to evolve effective methods to combat the multi-dimensional problems associated with HIV infection.

Health Education

Health education plays a crucial role in the control and containment of HIV infection. Medical and paramedical personnel need to be provided with clear guidelines dealing with these aspects so that they give correct information to all seropositive individuals. The high risk groups need to be provided with information about the risk involved in their life style and methods of prevention of HIV infection.

An intensive programme of education of the public about HIV infection will have to be initiated, using all available modes of communication. Selection of appropriate messages and appropriate media for reaching the target audiences need to be investigated and defined. ICMR is providing the necessary technical inputs for various agencies involved in this exercise of preparation of health education material for dissemination.

There had so far been very few attempts to assess the impact of the ongoing health education programme on HIV infection. CMC, Vellore carried out a pilot survey among persons attending the medical OPD (MOPD), STD clinic and prostitutes coming to hospital for various ailments in 1988. The survey showed that over 58 per cent of persons attending MOPD; 76 per cent of those attending STD clinic; and 90 per cent of prostitutes have not heard of AIDS. Most of these patients are from the low income group and are illiterate.

It would appear that the current health education campaign through the mass media has not yet reached the vulnerable but illiterate segments of population. There is an urgent need to explore alternative strategies for dissemination of vital health education messages for AIDS control, so that the amenable segments of high risk groups take necessary precautions to limit the spread of infection. Since health education plays the crucial role in AIDS control, it is important that adequate organised and sustained support for health education is provided as a part of the national AIDS control programme. At the same time, it is essential to ensure that fear and psychosis about AIDS does not occur and prevent people from seeking timely screening and medical aid.

Efforts should be made to highlight benefits to individuals belonging to high risk groups from seeking screening for HIV antibodies. These include information about (i) the chances of being found seropositive are less than 1 in 100 even in promiscuous men and women; if found seronegative, they could avoid future exposure to HIV infection; (ii) if found seropositive, care in

prevention and prompt treatment of common infection could result in symptom free life upto a decade.

Sentinel Surveillance for HIV Infection

Global data on epidemiology of HIV infection show that following the early phase when seropositivity rates are low and very few AIDS patients are reported, a steep increase in the infection rate occurs; subsequently after a variable period the steepness of the slope of the epidemic curve undergoes a reduction until a plateau is reached. The steepness of the slope of the epidemic curve and the rapidity with which the plateau is achieved, determine the load of infection in the community and these data give an indication about the number of AIDS patients who are likely to require health care in any given period. Since HIV infection persists lifelong, two major factors that determine the shape of the epidemic curve are the number of vulnerable uninfected individuals in the community and the impact of prophylactic measures adopted to contain the spread of infection.

In India, available data from clinical and serosurveillance indicate that the country is still in the early phase of the HIV epidemic. The first three phases of serosurveillance for HIV infection were aimed to obtain information on prevalence of the disease in some defined population groups and identify the major mode of transmission of infection; these have been achieved. These studies have also shown that prevalence of HIV infection varies in different groups and different regions and also changes over time. In data collection during the first three phases, there were substantial differences in number of persons screened in different centres and also the type of individuals screened at different time points in the same centre; it is difficult to use the data so far obtained to compute time trends or estimate regional differences.

There is, therefore, an urgent need to organise systematic epidemiological studies to define time trends in prevalence of HIV infection among some well defined groups in different regions of the country. ICMR has drawn up a protocol for such a study and it is expected that the sentinel surveillance activity would begin shortly. This study is expected to generate data that will help in evolving timely intervention strategies for control of HIV infection and also provide valuable tools for impact assessment of specific intervention programmes.

Future Research Plans

Results from the ongoing clinical and serosurveillance studies have clearly demonstrated that HIV infection has

gained a foot hold in India. The council has initiated studies on a wide range of problems associated with HIV infection. It is also proposed to establish a multi-disciplinary Institute for Research in AIDS with the following objectives:-

- (i) To coordinate the serosurveillance and epidemiological studies already initiated by the Council;
- (ii) To carry out virological, immunological and clinical studies in the entire spectrum of HIV infection ranging from asymptomatic HIV infection to terminal AIDS, so that natural history of the disease in India will be documented;
- (iii) To provide a model centre for care of HIV infected persons and to train clinicians in management of HIV infection;
- (iv) To undertake clinical trials of chemotherapeutic, immunotherapeutic and immunoprophylactic drugs as and when they become available; and
- (v) To provide technical information and support for preparation of health education material so that an intensive health education campaign to control HIV infection could be undertaken using all available channels of communication.

Studies that will be carried out by the proposed Institute are expected to provide vital leads for mounting appropriate intervention programmes aimed at containment and control of HIV infection in India.

Summary

India has the distinction of having conducted a systematic nation wide serosurveillance for HIV infection from 1986 for defining epidemiology of HIV infection at a very early stage of the epidemic when only a few patients of AIDS has been reported. Within a short span of 24 months the serosurveillance data showed that the magnitude of infection even in the high risk groups was low (4.5 per 1000); heterosexual promiscuity was the major mode of transmission of infection in India. The data from these studies provided the rational basis for formulating the national medium term plan for AIDS control. Detection of seropositives among blood donors led to the timely initiation of blood donor screening to ensure safety of transfused blood. The data also provided the technical information needed for designing appropriate health education material for AIDS control among high risk and vulnerable groups. It is expected that the sentinel surveillance to be initiated shortly will assist in monitoring time trends in HIV

infection and help in timely initiation of appropriate intervention strategies.

It is noteworthy that all along, the AIDS programme is being carried out through the existing health infrastructure, essential inputs were added wherever necessary. It is expected that the trained and sensitized medical and paramedical personnel in the surveillance centres will be able to take care of increasing need for serodiagnosis and also act as nodal training and quality control centres in the respective states. The sensitised and strengthened clinical departments especially of Internal Medicine and STD clinics will take up responsibility of counselling, care, and follow up of seropositive individuals including AIDS patients.

Organisation of the national AIDS control programme has posed a formidable challenge to the health care delivery systems even in developed countries. Problems in screening and identifying seropositive individuals, difficulties in persuading high risk groups to change their life styles, absence of specific therapy and high cost of therapeutic measures to prolong survival are some of the difficult issues that confront the health planners and policy makers. Mounting an AIDS control programme in developing country is a daunting task. However, the last three years have shown that India has the potential and capability of meeting the challenge and raise the hope that our country will be able to contain and control HIV infection.

ICMR NEWS

The annual Review Meeting of the National Cancer Registry Project was held at AIIMS, New Delhi (November 15-18, 1989).

Honours/Awards

Dr. A.S. Paintal, Director-General, ICMR, was presented a Fellowship Scroll by USSR Academy of Sciences, at New Delhi (November 16, 1989).

Dr. Mahtab, S. Bamji, Director Grade Scientist, National Institute of Nutrition (NIN), Hyderabad, has been elected Fellow of the Indian National Science Academy.

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Participation of ICMR Scientists in Scientific Events:

Dr. B.N. Saxena, Sr. Deputy Director-General, ICMR, participated in the International Medical Advisory Panel (IMAP) meeting of the International Planned Parenthood Federation, at Ottawa (November 1-7, 1989). Dr. Saxena also participated in the meeting of the Committee for the Study of Ethical Aspects of Human Reproduction, at Athens (November 13-14, 1989).

Dr. Leela Raman, Deputy Director, NIN, Hyderabad, participated as a Guest Counselor in the meeting of the Council of Scientific Advisors of the Children's Nutrition Research Centre, at Houston (November 1-3, 1989).

Dr. Vinodini Reddy, Director as also Dr. K. Vijayaraghavan and Dr. P. Bhaskaram, Asstt. Directors, NIN, Hyderabad, participated in the XIII Meeting of the

International Vitamin A Consultative Group, at Kathmandu (November 5-10, 1989).

Dr. S.P. Tripathi, Addl. Director-General, ICMR, participated in the Indo-EEC Symposium on Leprosy and Mycobacterial Infections, at Lonavala, Maharashtra (November 6-9, 1989).

Dr. P.K. Rajagopalan, Director, Vector Control Research Centre, Pondicherry, participated in the meeting of the WHO Expert Committee on Malaria, at Geneva (November 6-14, 1989).

Dr. A.S. Paintal participated in the World Congress of Pulmonary and Critical Care Medicine and presented papers on (i) Significance of Dry Coughs, Breathlessness, and Muscle Weakness—Present Status; and (ii) Lung Affairments, at Bombay (November 12-15, 1989). Dr. S.P. Tripathi also presented a paper on Recent Advances in the Treatment of Tuberculosis at this Congress.

Dr. Paintal delivered a talk on Some Issues Involved in International Cooperation in Science & Technology, at the International Seminar on S&T for National Development, International and Regional Cooperation, at New Delhi (November 14-16, 1989).

Dr. Tripathi delivered a lecture on AIDS, at the International Union of Immunological Society (IUIS)—WHO Advanced Immunology Course, at New Delhi (November 20, 1989).

Dr. V.P. Sharma, Director and Dr. Aruna Srivastava, Research Officer, Malaria Research Centre, Delhi, visited USSR for two weeks under Indo-USSR

Agreement in the Field of Medical and Public Health (November 12-25, 1989).

Dr. Usha K. Luthra, Addl. Director-General, ICMR, gave a lecture on Control of Oral Cancer—A National Priority, at the International Congress on Oral Cancer, at New Delhi (November 13, 1989).

Dr. Prema Ramachandran, Deputy Director-General, ICMR, participated in the WHO Consultative Group meeting to Review Technical and Managerial Guidelines on Maternal and Child Health and AIDS Prevention, at Geneva (November 20-22, 1989). She also participated in the International Conference on Implications of AIDS for Mother and Children, at Paris (November 25-30, 1989).

Dr. S.K. Kashyap, Director, National Institute of Occupational Health, Ahmedabad, participated in the International Conference on Total Human Exposure Monitoring and Assessment, at Las Vegas, USA (November 27 to December 1, 1989).

ICMR Headquarters and the Council's Malaria Research Centre at Delhi, participated in a Science & Technology Exhibition, at Allahabad, between November 11 and 19, 1989 organized to commemorate the 40th Anniversary of India's Independence and the Birth Centenary of Pandit Jawaharlal Nehru.

ICMR AIDED SYMPOSIA/SEMINARS/WORKSHOPS/COURSES/CONFERENCES

Symposium/Seminar/Workshop/ Course/Conference	Date & Place	Contact Address
Brachytherapy Workshop for Cancer Cervix.	November, 1989; Betul (M.P.)	Dr. Anand Vijay Kumar, Secretary, Paramedical Section, Christian Medical Association of India, Smruti Theatre Compound, Nagpur.
National Workshop on Advances in Flexible Fiberoptic Bronchoscopy.	November 4-5, 1989; Chandigarh	Dr. S.K. Jindal, Department of Chest Diseases, Postgraduate Institute of Medical Education and Research, Chandigarh.
All India Symposium on Biophysics of Cell Structure and Function.	November 6-8, 1989; Chandigarh.	Dr. P.C. Mangal, Chairman, Department of Bio-Physics, Punjab University, Chandigarh.
International Symposium on Levels of Awareness and Conscious Experiences.	November 6-9, 1989; Visakhapatnam	Prof. P.V. Krishna Rao, Director, Institute for Yoga & Consciousness, Andhra University, Vijayanagram Palace, Visakhapatnam.
Seminar on Zoonoses.	November 9-10, 1989; Dibrugarh	Dr. L.P. Datta, Director, Regional Medical Research Centre (ICMR), P.B. No.105, Dibrugarh.
National Symposium on Social and Legal Aspects for AIDS Prevention and Control.	November 9-11, 1989; New Delhi	Dr. T.R.C. Sinha, General Secretary, National Environmental Sciences Academy, Bettiah.
XVI Biennial Conference of the Indian Association of Leprologists.	November 9-12, 1989; Trichur	Dr. P. Vijay Shanker, Damien Institute, Ayyappankavu, Trichur.
Seminar on Pathology of Cardiomyopathies.	November 11, 1989; Bhubaneswar	Professor L.N. Mohapatra, Convenor, Indian Association of Pathologists and Microbiologists (Orissa Chapter) and Director, Regional Medical Research Centre (ICMR), Bhubaneswar.
Seminar on Modern Biology: Genetic Recombination.	November 19-26, 1989; Mahabaleshwar	Dr. John Barnabas, Scientist (Director's Grade), National Chemical Laboratory, Pune.
Conference on Health Care for the Villagers and Urban Slums.	November 23-25, 1989; Calcutta	Dr. Ashok Sahani, Professor & Hon. Executive Director, Indian Society of Health Administrators, 104 (13/37), Cambridge Road Cross, Ulsoor, Bangalore.
National Seminar on Squint and Amblyopia.	November 25-27, 1989; New Delhi	Dr. Vimla Menon, Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi.

Symposium/Seminar/Workshop/ Course/Conference	Date & Place	Contact Address
All India Symposium on Reproductive Biology and General Endocrinology.	November 26-28, 1989; Baroda	Prof. P.M. Ambedkar, Department of Zoology, M.S. University of Baroda, Baroda.
Workshop on Recent Advances in Intensive Care.	November 26-30, 1989; New Delhi	Dr. H.K. Kaul, Professor & Head, Department of Anaesthesiology, All India Institute of Medical Sciences, New Delhi.
International Conference on Structure and Functions of Biomembranes.	November 28-December 2, 1989; Calcutta	Dr. Parul Chakrabarti, Convenor, Bose Institute, 93/1, APC Road, Calcutta.
Seminar on Biochemistry and Modern Biology.	December 4-14, 1989; Lakshadweep	Prof. S.P. Modak, Convenor, Guha Research Conference, Department of Zoology, University of Poona, Pune.
Workshop on Paediatric Urological Reconstructive Surgery.	December 23-25, 1989; Chandigarh	Dr. S.K. Mitra, Professor & Head, Department of Paediatric Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh.
Symposia on Cytogenetics; Plant Cell Biology; Mammalian Systems; and Microbial Systems, and Annual Meeting of the Indian Society of Cell Biology.	December 27-29, 1989; Hyderabad	Dr. M.R. Das, Deputy Director, Centre for Cellular and Molecular Biology, Hyderabad.
XXXIII All India Obstetric and Gynaecological Congress.	December 28-30, 1989; Patna	Dr. J. Mishra, Department of Obstetrics and Gynaecology, Hospital for Women, Patna Medical College, Patna.
Symposium on Current Advances in Molecular Biochemistry: Applications in Health, Environment, and Agriculture.	December 28-31, 1989; Lucknow	Dr. G.G. Sanwal, Professor and Head, Department of Biochemistry, Lucknow University, Lucknow.
III International Congress on Traditional Asian Medicine.	January 4-7, 1990; Bombay	Dr. K.M. Parikh, Chairman, Organising Committee, III International Congress on Traditional Asian Medicine, C/o Zandu Pharmaceutical Works Ltd., Dadar, Bombay.
Seminar on Indian Speech, Language and Hearing Tests—the proposed ISHA battery.	February 8-9, 1990; New Delhi	Dr. S.K. Kacker, Professor & Head, Department of Otorhinolaryngology, All India Institute of Medical Sciences, New Delhi.
National Symposium on Application of Recombinant DNA Technology in Disease Diagnosis.	March 23-25, 1989; Hyderabad	Prof. P.P. Reddy, Director, Institute of Genetics and Hospital for Genetic Diseases, Osmania University, Hyderabad.

COUNCIL'S TRAINING PROGRAMMES

Nutrition

Physicians, Chemists, Safety Officers, Hygienists
(November 6-10, 1989).

At the National Institute of Nutrition, Hyderabad:

... Annual Certificate Course in Nutrition (December 1, 1989 to February 28, 1990).

Occupational Health

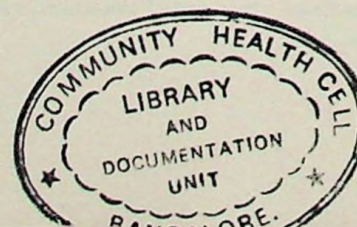
At the National Institute of Occupational Health, Ahmedabad:

... Training Course on Disaster Management of Hazardous Chemicals in Industry for Industrial

Laboratory Animal Technology

At the Laboratory Animal Information Service Centre, National Institute of Nutrition, Hyderabad:

... Training Course for Laboratory Animal Supervisors (September 1 to November 30, 1989).



SOME AVAILABLE ICMR PUBLICATIONS

	Price Rs.
Growth & Physical Development of Indian Infants and Children (1972), Reprinted 1989	10.00
Studies on Weaning & Supplementary Foods (1974), Reprinted 1984	6.00
Studies on Pre-School Children (1974), Reprinted 1984	6.00
A Manual of Nutrition (1973), Second Edition 1974, Reprinted 1984	2.50
Lqw Cost Nutritious Supplements (1972), Second Edition 1975, Reprinted 1977	1.50
Menus for Low Cost Balanced Diets and School Lunch Programmes Suitable for South India (1959), Third Edition 1977, Reprinted 1984	2.00
Menus for Low Cost Balanced Diets and School Lunch Programmes Suitable for North India (1959), Third Edition 1977, Reprinted 1984	2.00
Some Common Indian Recipes and their Nutritive Value (1964), Fourth Edition 1977, Reprinted 1984, by Swaran Pasricha and L.M. Rebello	6.00
Nutrition for Mother & Child (1962), Third Edition 1978, Reprinted 1983, by P.S. Venkatachalam and L.M. Rebello	5.00
Japanese Encephalitis in India (Revised Edition 1980)	5.00
Some Therapeutic Diets (1969), Fourth Edition 1981, Reprinted 1983, Revised 1988, by Swaran Pasricha	2.00
Recommended Dietary Intakes for Indians (1981), Reprinted 1984	4.60
Lathyrism: A Preventable Paralysis (Revised Edition 1983)	1.50
A Manual of Laboratory Techniques (1983), Edited by N. Raghuramulu, K. Madhavan Nair and S. Kalyanasundaram	30.00
Fruits (1983), by Indira Gopalan and M. Mohan Ram	2.50
Count What You Eat (1989), by Swaran Pasricha	4.50
The Anophelines of India (Revised Edition 1984), by T. Ramachandra Rao	150.00
Depressive Disease (1986), by A. Venkoba Rao	58.00
Medicinal Plants of India, Vol. 2 (1987)	136.00

Unpriced Publications

(for limited distribution)

- Collaborative Study on Short-term Sequelae of Induced Abortion (1981)
- Proceedings of the Indo-UK Workshop on Leishmaniasis. (1983)
- Peoples of India—Some Genetic Aspects (1983)
- Management of Acute Diarrhoea (1985)
- Plague Conquest and Eradication in India (1987) by S.C. Seal
- Laboratory Manual for the Diagnosis of Haemophiloid Disorders (1989), by Manorama Bhargava and Dinesh Jain

These publications are available on prepayment of cost by cheque or postal order (bank and postal charges will be extra) drawn in favour of the Director-General, Indian Council of Medical Research, New Delhi. Money orders are not acceptable. All correspondence in this regard should be addressed to the Chief, Division of Publication and Information, Indian Council of Medical Research, Post Box No.4508, Ansari Nagar, New Delhi-110029.

INDIAN COUNCIL OF MEDICAL RESEARCH

International Research Fellowships of National Institutes of Health(USA)

Applications (on prescribed form) are invited from candidates for award of International Research Fellowships of the National Institutes of Health, USA for specialised training in that country.

ELIGIBILITY REQUIREMENTS

To be eligible for an International Research Fellowship, an applicant must:

1. hold an earned doctoral degree (PhD, MD, DO, DDS, DVM, OD, DPM, ScD, EngD, Dr PH, or DNS) or the equivalent in a health science field at the time of submission of an application to the Nominating Committee;
2. have earned the doctoral degree within 10 years of the application receipt date (should have received their doctoral degree on August 1, 1980 or thereafter);
3. have demonstrated the ability to engage in independent basic or clinical research;
4. submit a research proposal in an area of one of the biomedical or behavioural sciences;
5. have a sponsor in the United States at a nonprofit institution who has agreed to accept the applicant for research on the applicant's proposed project;
6. have assurance from a nonprofit institution in the home country that there is a position to which the applicant can return after completion of the fellowship;
7. be proficient in spoken and written English;
8. should not have been in the United States on J-1 visa for more than two months if they apply for a two year fellowship or for more than 14 months if they apply for a one year fellowship;
9. not be a US citizen or a permanent US resident.

Application forms and details of the fellowship can be obtained before February 20, 1990 from the Director-General, Indian Council of Medical Research (Room No.406), Post Box No.4508, Ansari Nagar, New Delhi 110029. The last date for receipt of completed application form by ICMR is March 5, 1990. Application forms received after the closing date will not be considered.

ANNOUNCEMENT

ICMR has set up an External Quality Assurance Facility for scientific investigators working in the area of Reproduction Biology as regards FSH, LH, Prolactin, Estradiol, Progesterone and Testosterone. Those who are desirous of availing this facility may contact Dr. S.R. Mokkalpati, Senior Research Officer, ICMR, Ansari Nagar, New Delhi-110029/Prof. D.K. Hazra, Incharge, EQA Scheme, Nuclear Medicine & RIA Unit, Postgraduate Department of Medicine, S.N. Medical College, Agra.

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