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In This Issue...

Global Malaria Research with Particular Reference to India in the Light of a Newly Developed Database

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Malaria continues to remain a serious, widespread and complex global health problem affecting 109 countries and putting around 3 billion people *i.e.* 40% of the world population at the risk of infection. The World Health Organization (WHO) estimates around 250 million malaria episodes with over 1 million deaths across the globe every year[1,2]. In malaria endemic countries, related illnesses and deaths have serious economic as well as human costs causing an estimated US $12 billion loss in Africa alone each year. The cost of care and reduced productivity due to high malaria burden lowers the growth of country's annual gross national product by 2%. Considering the gravity and its overall impact on human health, poverty and socio-economic development malaria control has been included in UN Millennium Development Goals as well[3].

Until late 1960s malaria was not only found in tropical areas of Africa, Latin America and Asia, but also in large parts of Europe, parts of USA and northern Australia. The global malaria eradication campaign of the 1950s and 1960s based on the use of the insecticide DDT and wonder drug chloroquine achieved elimination of malaria from the industrialized world and resulted in drastic reduction of malaria elsewhere specially Asia. But in later years due to development of insecticide resistance in mosquito vectors and drug resistance in the parasite coupled with some administrative and technical constraints malaria resurged back and reached a peak during 1970s[4]. India has been in the forefront of malaria research with the landmark discovery of Sir Ronald Ross elucidating the role of female anopheles mosquito in the transmission of malaria which laid the foundation for malaria research and its control. India achieved tremendous success in controlling malaria in early sixties after the setting of National Malaria Eradication Programme in 1958 but in later years situation deteriorated and malaria reached a peak in 1976. Thereafter many modifications were made in the control programme and malaria was brought under control[5].

Recent few years have witnessed a drastic change and new challenges in malaria control due to ecological changes, industrialization, urbanization, developmental activities resulting in different malaria paradigms demanding situation specific control strategies[6]. With the threatening phenomenon of global climate change there is also a possibility of re-emergence of malaria in areas where it was once eliminated and enhancement of transmission period in others[7,8]. Therefore a lot of attention is now being paid to devise new alternative strategies for its better management and control.

Necessity of a Comprehensive and Exclusive Database

Research publications are the only indicators to throw light on the amount and type of work being done across the globe to combat this menace. But the problem lies in collecting and collating such diverse publications at one place as there is no single source or database to gather malaria related information. Though a lot of information on malaria and its associated aspects is available on the global network, it is too wide, intermixed and scattered. There is no comprehensive database on malaria research output which can be handy, easy to access and time saving. Therefore an attempt was made to fill this gap and come out with a sound comprehensive database on malaria which may be helpful to those also who are working in tough remote areas and also to analyse it critically to find out swings and trends and pin point strong and weak area of research. As the database pertains to malaria related publications, its name was given as MALPUB.

The Process and Creation of a New Database

The development of database was started with efforts to collect global information on research publications in the field of malaria including Indian research papers published during the last 50 years *i.e.* between 1955-2005. Regress screening of major global secondary services such as SCI, MEDLINE, TDB, ISA was made to capture all the published research papers on malaria on the basis of pre-defined key words. The data sources were searched using the search string 'malaria / plasmodium / anopheles / mosquito control / malaria epidemiology / malaria outbreak / malarial drug resistance / malaria remote sensing / malaria vaccines / malaria in pregnancy / economic loss due to malaria / malaria in children / malaria in child / antimalaria / bednets / impregnated bed nets / *Plasmodium vivax* / *P. vivax* / vivax malaria / *Plasmodium falciparam* / *P. falciparum* / *Plasmodium knowlesi* / *P. knowlesi* / *vivax genome* / malaria disease burden', *etc.* for research papers in Web of Science (WOS) from 1955 to 2005, MEDLINE 1955-2005, Tropical Diseases Bulletin (TDB) 1955-2005, Ovid (Global Health Database)1972- 2005, Indian Science Abstracts (ISA)1965-2005 and Indian institutes active in the field over a period of study. Some of the left out journals were physically consulted, which were not covered by any of these services but were important.

The data from hard copies were collected on pre-designed formatted input sheets. Each record was provided with suitable keywords and institutional affiliation of the author (wherever available). Once the basic data for other than Indian research papers were captured from the digital sources, it was converted into searchable database format (compatible to database for the data from hard copy). Duplicate entries from different secondary services were removed by systematically screening the records. The data collected were tabulated and efforts were made to collate, remove duplicates, scrutinize and to convert the same into a searchable mode on a CD.

Finally, a new database of journal research papers on malaria named MALPUB containing the searchable information on malaria related research publications was ready. The software has two versions: the user version is having facilities for search, (simple and advanced), summarization, saving (in desired format) and printing. The full version (Admin CD) is having additional facilities, such as data editing, data updates, deletion or addition of records, data entry and saving mode. The 50 years database is common to both the versions. Finally formal validation, editing and corrections (wherever needed) were also carried out. Computer inputs were also validated and checked, and many test run (s) were carried out. Efforts were also made to analyze this database particularly of last 25 years so as to pin point the most sought after journals by the malaria researchers, prolific institutes, preferred areas of

research and swing if any in between. Facility has also been provided to save the data in Medline or PubMed format. Results of the analysis of the same are presented here with special reference to Indian contributions.

Analysis and Emerging Global Trends

Table I depicts the number of records in terms of malaria research publications collected from various global secondary services. It is evident that MEDLINE is the most prolific source to collect maximum papers in the desired field. It was found that a total 1,22,055 papers were published between 1955-2005 throughout the globe. There was a considerable increase (47.2%) in number of papers from 4026 during 1955-65 to 57,619 during 1996-05. The number of journals selected for publishing malaria research also rose from 502 during 1955-65 to 3072 during 1996-2005 (Table II). Among the countries involved in malaria research, USA tops the list with global publication share of 26.89% followed by UK, France, India, Australia and Germany. It is noteworthy that except India malaria is not a serious problem for other top 4 countries. There were around 6064 journals which were selected for publishing 1,22,055 research papers during 1955-2005. The first 50% papers appeared in total of 47 journals. Though there were some swing in between but among the top most journals contributing more than world average were *Trans R Soc Trop Med & Hyg* followed by *Am J Trop Med & Hyg, Mol Biochem Parasitol, Lancet, Ann Trop Med Parasitol, Exp Parasitol, J Am Mosq Control Assoc, Infect Immunity, Trop Med Int Health, Parasitol Today* and *J Med Entomol*. Among the Indian Journals *Indian J Malariol* stood at the top followed by *Indian J Med Res* and *J Commun Dis* (Fig. 1).

Table I: Number of papers collected from different secondary services

Source (secondary services)	Period (years)	Number of papers
Web of Science (WOS)	1955-2005	42713
MEDLINE	1955-2005	51563
TDB	1955-2005	30000
Ovid	1972-2005	38138
ISA	1965-2005	5000

Duplicate and overlapping records were removed later

Table II: Decadal growth of research papers and journals in the field of malaria

Years	Number of Papers	Total Journal
1955-1965	4026	502
1966-1975	9779	953
1976-1985	18141	1339
1986-1995	32470	2070
1996-2005	57619	3072
Total	1,22055	3072

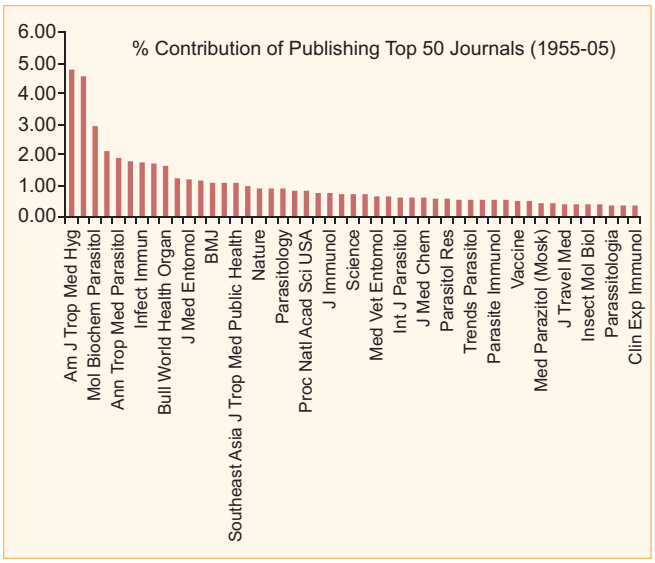

Fig. 1. Journal selection pattern for publication of malaria research around the globe

Country-wise Contribution of Global Malaria Research

India ranks 3rd among the top 20 countries in malaria research, with its global publications share of 6.57% computed on the basis of cumulative publications output during the period of 1981-2005. The other countries that contributed publications in the range of more than 2% were Switzerland (2.78%), Japan (2.55%) and Brazil (2.41%). The overall global publication share of top 20 countries in malaria research ranged from 0.82 to 26.89%. Switzerland, Japan, Netherlands, China, Italy, and Kenya ranked from seventh to twelfth positions (their global publication share ranging from 1.69 to 2.78%). The countries that rank between 13th and 20th positions are Nigeria, Canada, Sweden, South Africa, Denmark and Belgium with their global publication share ranging from 1.07% to 1.25%. USA, UK,India, France, Netherlands, Switzerland, Germany, Thailand, China, Australia, South Africa, Italy, Brazil, Japan, Nigeria, Sweden show their continuous presence among top 20 countries. USSR, Belgium, Israel, Papua N Guinea, Kenya, Denmark and Spain appear at intervals (Fig. 2).

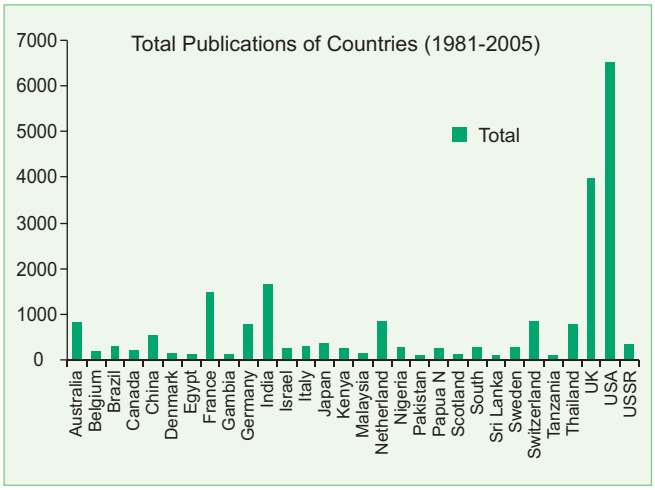

Fig. 2 . Country-wise publication pattern (No. of papers published)

USSR was present continuously among the top 20 countries till 1990. During 1981-85 it ranked 11th with 1.25% total contribution. In 1986-90 it shifted to16th position with 1.34% total contributions among MALPUB publishing countries. It's individual share increased, but in the world context the share decreased and its position fell down. Belgium showed its presence among the top 20 countries in 1981-85 and 1996-2000 with 14th and 20th position, respectively. Israel introduced itself in 1981-85 and in 1991-95 with percentage share of 0.95 and 1.0, respectively. However, in spite of increasing its share its rank fell down from 15th to 18th. Papua N Guinea also came in the range of countries among the top 20. Its publication share in 1981-85 and in 1986-90 had been 0.82 and 1.03 respectively.

Global Share of Developing Countries

Some of the developing countries that have shown rise in their global publications share include India, Thailand, Brazil and Kenya. India has grown significantly in terms of papers from 5.34 to 7.88%.The shift in number of papers from top developing countries are from 0.34 (Papua N Guinea) to 3.07% (Thailand). The total percentage for 25 years was in the range of 0.65 (Korea) to 14.02 % (Thailand) apart from India. The new countries over the years entering into top group are Kenya and Nigeria. The ranking of Papua N Guinea has fallen from 17th to 47th.

The average growth rate of developing countries in top 20 is from -14.39 to 29.35 during successive years. India and Brazil are the top most growing countries. Their annual growth rate increased from -14.39 to 15.12. Thailand also came up with increased share but its average growth rate decreased from 15.82 to 0.92. China's average growth fell down, from 23.41 to 1.84 during the period of 25 years. Kenya's average growth rate decreased but finally improved in terms of annual growth rate (Table III, Fig. 3).

Table III: Average growth rate of developing countries

(Top 5 developing countries)

Country	1981-85	86-90	91-95	96-2000	2000-05
India	-14.39	13.38	2.86	2.10	7.88
Brazil	-12.6	-8.89	15.12	8.4	10.27
Thailand	15.82	8.25	2.91	5.03	0.92
China	23.41	0	9.37	14.76	1.84
Kenya	29.35	28.09	6.24	-9.27	29.13

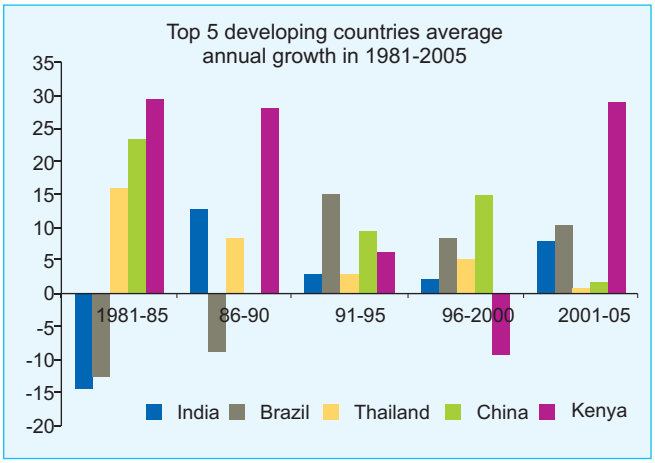

Fig. 3. Annual growth pattern of top 5 developing countries

India's Publication Growth Rate in World Context

The total number of countries involved in malaria research from 1981-2005 have increased tremendously from 136 (1981-85) to 193 (01-05). India has maintained it's position among the top 4 countries through out the period of study (1981-2005) in the bracket of USA, UK, and France. In this way India has established itself as one of the giants in the field of malaria research. Developed and developing countries differ significantly in their annual publication growth rate in the field of malaria research. The developed countries, with a few exceptions, have been very slow in their publications growth rate.

In spite of top rank of USA, it has not shown any considerable annual growth; only its percentage share has been more to keep it at the top position. Similarly UK gets higher position due to its share but

its annual growth has decreased from 9.42 to 6.36. France and Australia have shown an increase in their annual growth rate. Among the top 5, India is the top most growing country. India's average growth rate during 1981-85 was -14.39 and during 86-90 it increased up to 13.38. There was a sudden decrease during 1991-95, however, the growth rate again picked up by 2001-05. (Table IV, Fig. 4)

Table IV: Top 5 countries in terms of publication growth (1981-2005)

Country	1981-85	86-90	91-95	96-2000	2001-05
USA	5.63	4.69	1.97	6.21	8.67
UK	9.42	0.27	1.80	7.17	6.36
India	-14.39	13.38	2.86	2.10	7.88
France	2.10	6.58	6.58	1.63	9.18
Australia	-5.76	13.19	2.65	7.19	5.36

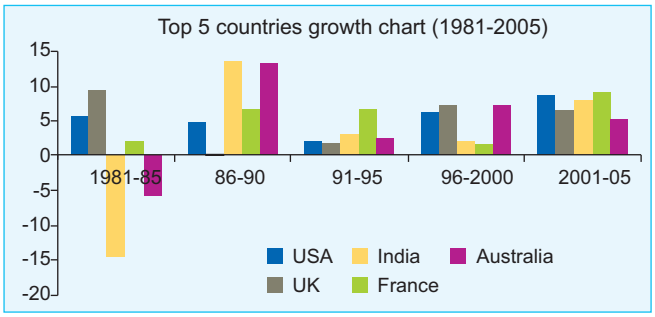

Fig. 4. Publication growth of top 5 countries

High Productivity Malaria Research Institutions in India

India has nearly 442 high productive institutions in the field of malaria research, as seen from the cumulative national publications data during 1986-2005. National Institute of Malaria Research (Earlier Malaria Research Center), Delhi, contributed maximum papers (18.64%) during the period of study followed by Central Drug Research Institute, Lucknow (10.06%), Vector Control Research Center, Pondicherry (5.66%) and International Center for Genetic Engineering and Biotechnology, New Delhi with 4.44%. The top 10 institutes contributed approximately 55% papers with an average of 285.8 paper per Institute. The rest of the papers (2389) were published by the rest 432 research institution and University Departments with an average of 5.53 paper per institute. Thus the apex institutions in the field of malaria research for India are; NIMR, New Delhi; CDRI, Lucknow; VCRC, Pondicherry; ICGEB, New Delhi; RMRC, Bhubaneswar; AIIMS, New Delhi; PGIMER, Chandigarh; IISc, Bengalore and Ispat Gen. Hospital, Rourkela (Fig. 5).

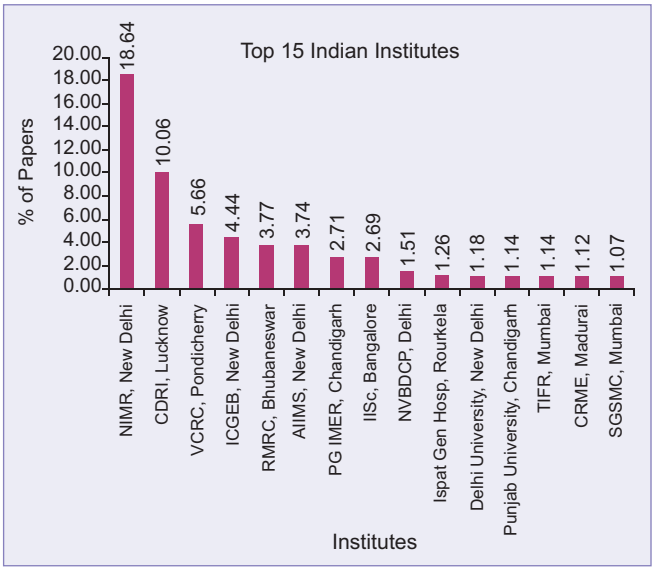

Fig. 5. Top most institutes in India involved in malaria research

Of these top 15 institutes, 8 belong to R & D establishments like the Indian Council of Medical Research (ICMR), Council of Scientific & Industrial Research (CSIR) and Department of Biotechnology (DBT) including Indian Institute of Science, Bangalore. Rest of the institute are from Medical Colleges and Academic Institutions of India *e.g.* AIIMS, New Delhi; PGIMER, Chandigarh, NVBDCP, Delhi, Ispat General Hospital, Rourkela, University of Delhi, Punjab University, Chandigarh, Seth GS Medical College and KEM Hospital (SGSMC) Mumbai.

Among the R&D institutions from India, Institutes from ICMR contributed maximum (31.2%) papers. Among the ICMR institutes the percentage share of institutes have been depicted in Table V.

Table V: The publication share of ICMR institutes

Sl. No.	Institutes	% share of publication in malaria
1.	National Institute of Malaria Research, New Delhi	59.85
2.	Vector Control Research Centre, Pondicherry	18.19
3.	Regional Medical Research Centre Bhubaneswar	12.12
4.	Centre for Research in Medical Entomology, Madurai	3.61
5.	National Institute of Virology, Pune	2.14
6.	Others	4.09

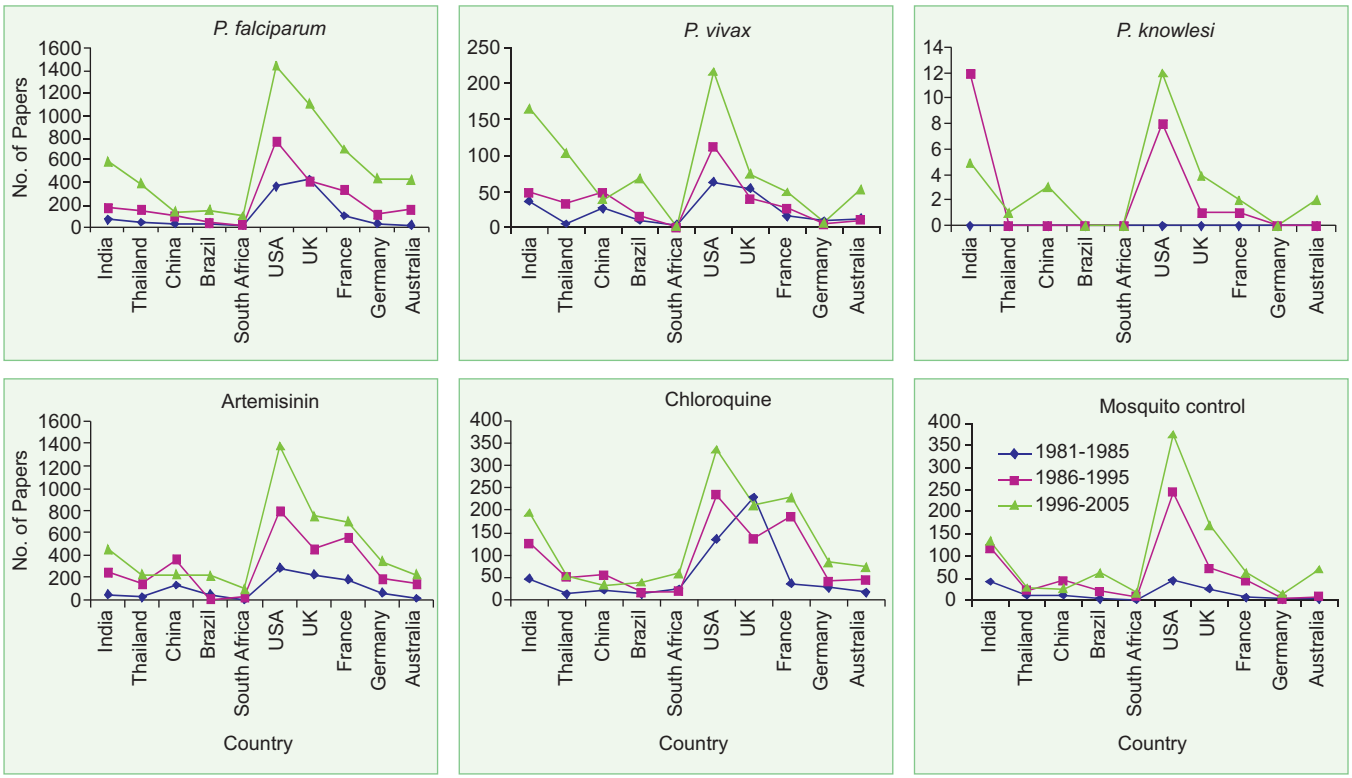

Fig. 6. Subject-wise analysis of malaria publications

Subject Wise Analysis

A total of 18 major subject areas were identified within malaria research and they together comprised about 52% of all the papers. It was remarkable that in the field of parasite biology most of the efforts were concentrated on *Plasmodium falciparum*, whereas, *P. vivax* has shown only marginal increase. Study also indicated that research efforts have increased in the area of modern biology such as gene and genomics, malaria vaccine, drug development, new diagnostics, *etc.* in the recent past. Most of the research in India is being done by research institutions and medical colleges, while universities are contributing very little in malaria research. It is pertinent to highlight that malaria control programmes of 1960s and 1970s were based mainly on the use of insecticide DDT and drug chloroquine and this was reflected in the publication output as well. With the implementation of Roll Back Malaria (RBM) Programme of WHO in 1998 and other malaria control initiatives[9,10], research has shifted to new areas like bed nets, artemisinin based combination therapy, vaccine, drug development, gene and genomics, *etc*.

Among the productivity of developing countries as compared to world average India has shown its strong commitment towards artemisinin based combination therapy (ACT), drug resistance, malaria in pregnancy and malaria in children, mosquito or vector control, DDT or DDT resistance, fish or biological control and bed nets showing an steady increase from 1981 through 1996-05.

China has shown strong commitment in artemisinin based combination therapy of malaria control whereas Thailand has also depicted the same trend as of India with main focus on drug resistance, ACTs, malaria in children, *etc.* (Fig. 6).

Comparison of the databases of SCI, MEDLINE, TDB, *etc.* indicate that for malaria papers TDB is the most comprehensive source of information particularly for developing and less developed countries, whereas MEDLINE is world's most comprehensive source for life sciences and biomedical bibliographic information resource. The journals covered in SCI are more from the developed countries with USA being on top followed by UK, Germany, Netherland, France, *etc.*, whereas in MEDLINE, journals from the developing countries like India, China, Brazil, Thailand are having better

percentage share. The study also highlights that malaria research is quite diverse in nature and get publish in wide variety of journals ranging from journals in the field of Entomology and Sociology to Gene and Genomics and from Nature and New England Journal of Medicine to Lancet, Journal of Bioscience and Infection and Immunity.

As Malaria control has also been embedded in the Millennium Development Goals, the target is to achieve the universal coverage by providing the key malaria interventions to the malaria endemic countries and lower the malaria burden. International efforts to control malaria has been geared up as was reflected in the increase in the funding from $ 730 millions in 2006 to $1.7 billion in 2009, which has allowed dramatic scale up of malaria control interventions in several countries along with measurable reductions in malaria burden[11]. The theme of World Malaria Day of 2010 (25th of April) is 'Counting Malaria Out' is meant to intensifying global efforts to reach the first important milestone by 2010 *i.e.* universal coverage for all populations at risk with locally appropriate interventions for prevention and case management and reduction in number of malaria cases by 50% and near zero deaths by 2015.

This database may prove to be very useful in the fight against malaria by the scientists, academicians and policy makers to plan and carry out new research studies and also formulate better control strategies which will go a long way in reducing global malaria burden and achieving Millennium Development Goals and visualizing a distant dream of a malaria free world.

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ABSTRACTS

Some Research Projects Completed Recently

Modulation of Galectin-3 by dietary galectin Inhibitors *in vitro* and *in vivo* against metastasis

Studies were conducted to understand the potential role of galectin-3 and dietary galectin inhibitors in tumour spread and prevention respectively. Systematic analysis of galectin-3 levels in various normal and metastatic cell lines indicated the correlation between galectin-3 level expression *vs* stage of cancer. Data suggested the critical involvement of galectin-3 in metastatic spread. The study established a constant and renewable source of galectin-3 by establishing recombinant galectin-3 expressing *E.coli* and ensuring the production of galectin-3, which is similar to that found in cancer patients. Polyclonal antibody to galectin-3 (PcAb-galectin-3) was produced and employed for various studies including the mechanism and efficacy of dietary galectin-inhibitors. Isolation and identification of potent galectin-inhibitors from dietary sources were also performed. Subsequently, series of dietary sources were examined for its potential galectin-3

blockade that can potentially halt or prevent metastasis. Screening studies indicated that few dietary sources including pectic polysaccharides from swallow root (SR) and carrot (CR) expressed potent galectin-3 inhibitory property better than citrus pectin, which had been the only source that has been demonstrated with galectin-3 inhibitory property.

SR and CR were thus selected for the mechanism of action. Structure-function studies revealed the presence of galactose and arabinose, probably in the form of arbino-galactans, which inhibited galectin-3 mediated action respectively. SR and CR galectin-3 inhibitors inhibited induction of galectin-3 itself in addition to galectin-3 mediated cell-cell interaction, cancer cell invasion, tumour colony formation, *etc.*, which are essential to function against cancer metastasis. Further, galectin-inhibitors exerted their effect at molecular levels as evidenced by modulation of tumour suppressor gene product (p53), transcription factors (NFkB) that is necessary for proliferation, Caspases (responsible for induction of apoptosis), matrix metalloproteinases (responsible for cell invasion) and Bcl-2 (an anti-apoptotic protein) in both *in vitro* and *in vivo* models. Overall data of the current study thus emphasizes the promising role of dietary galectin inhibitors against metastasis.

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A study of the risk factors for cancer of the pancreas

A case-control study was carried out on 249 patients with proven pancreatic cancer and 1000 healthy controls matched for age and sex. The various risk factors studied were age, cronic pancreatitis, diabetes mellitus, family history of any cancer, body mass index, smoking, alcohol, dietary pattern, and frequency of consumption of macro-and micro-nutrients. The most important risk factors identified after multivariate logistic regression analysis were – chronic pancreatitis (OR 123.94, 95% CI 15.51 – 990.09), diabetes of >4 years duration (OR 2.99, 95% CI 1.67 – 5.36), smoking (OR 2.08, 95% CI 1.45 – 2.99), and family history of cancer (OR 3.35, 95% CI 1.66 – 6.78). Among the dietary factors, non-vegetarian diet (OR 1.54, 95% CI 1.09 – 2.19), higher intakes of carbohydrate (OR 2.59, 95% CI 1.67 – 4.02) and proteins (OR 1.77, 95% CI 1.14 – 2.77) were risk factors while higher intakes of β carotene (OR 0.52, 95% CI 0.37 – 0.75) and chromium containing food items (OR 0.27, 95% CI 0.17 – 0.40) were found to be protective.

The identification of risk factors is important for preventive strategies for pancreatic cancer. The study highlights the important need for preventive strategies and screening programme aimed at high risk population to reduce the incidence of this highly malignant and lethal cancer, and improve its prognosis. The study was of the view that a population based surveillance programme for early diagnosis of pancreatic cancer be considered to target high-risk individuals in order to reduce pancreatic cancer related mortality.

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A comparative study of the influence of preoperative, intracameral viscoelastic agents on post-operative anterior chamber depth and intraocular pressure in trabeculectomy

The study was carried out on 71 consecutive eyes with primary open angle glaucoma or primary chronic angle closure glaucoma undergoing conventional trabeculectomy to compare the influence of pre-operative intracameral sodium hyaluronate 1% with hydroxypropyl methylcellulose 2 % (HPMC2%) on postoperative anterior chamber depth (AC depth) and intraocular pressure (IOP) in trabeculectomy. In all cases balanced salt solution (BSS) (group A) or HPMC2% (group B), or sodium hyaluronate 1% (group C) was left in the anterior chamber at the end of the surgery. All patients were observed serially on days 1,3,5,7 and 14 and months 1,3 and 6 postoperatively. The main outcome measure was restoration of AC depth to preoperative level with IOP of less than 21 mm Hg and no additional antiglaucoma medication or surgery.

The AC depth decreased to a maximum of 2.38± 0.61 (20.94% decrease) in group A, 2.84 ± 0.45 (6.30% decrease in group B on the 3rd postoperative day and 2.82 ± 0.28 (1.40% decrease) in group C on the 5th postoperative day following which complete restoration of Ac depth occurred by the 3rd month in group A, 1 month in group B and the 14th day in group C. Overall, the IOP decreased to 13.93 ± 2.25 (54.75% decrease) in group A, 14.01 ± 2.57 (51.27% decrease) in group B and 14.44 ± 2.61 (51.40% decrease in group C at 6 months. Three eyes developed flat anterior chamber only in group A. Shallow AC was seen in one eye in group A and three eyes (grade 1) in group B. Complications like choroidal detachment and hyphema were seen only in group A. Initial postoperative elevation (IOP spikes) of IOP (although minimal) was seen in 5 eyes in group C which required frequent monitoring and active intervention. The incidence of late postoperative bleb failure was more in group A and C. Absolute success was maximally achieved in group B.

It was concluded that the efficacy and economical advantages of intracameral injection of HPMC 2% during trabeculectomy are more as compared to BSS and sodium hyaluronate 1%. HPMC 2% helps to maintain AC depth and reduces incidence of complications related to shallow AC and ocular hypotony following trabeculectomy.

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Correlation of histology with diffusion tensor imaging in the developing cerebellum

The study was performed on 15 human fetuses with gestational age (GA) ranging from 14 to 40 weeks to observe the histogenesis of different cortical layers during the development of cerebellum and correlate the histogenesis of different cortical layers with diffusion tensor imaging.

Whole brain conventional MRI including diffusion tensor imaging (DTI) was performed on a 1.5T MRI scanner using a standard quadrature extremity coil/head coil for both transmission of radiofrequency pulses and signal reception. DTI data were acquired using a single-shot echo-planar dual spin echo sequence with ramp sampling. DTI data were processed and evaluated using JAVA based software to generate various DTI derived metrics *i.e.* fractional anisotropy (FA) and mean diffusivity (MD). Region of interest (ROI) analysis was performed for the calculation of the various DTI derived metrics.

In the fetuses, ROIs were placed in the cerebellar cortical region and middle cerebellar preduncles (MCP) at the level of fourth ventricle. After imaging, the whole of the excised cerebellum was cut in axial axis and blocked, sectioned and stained. Morphometric analysis was done in the digitalized images using BIOVIS image analysis system.

It was observed that the cerebellar cortical fractional anisotrophy (FA) reached its peak value at 28 weeks, and then decreased gradually until 37 weeks. The time course of glial fibrillary acidic protein (GFAP) expression paralleled that of FA in the cerebellar cortex from 20 weeks of gestation upto the GA at which the FA reached its peak value (28 weeks GA). No significant correlation was observed between cortical FA values and

percentage of neuron specific enclose (NSE) positive neurons in the internal granular layer of the cerebellar cortex. In the middle cerebellar penduncle the FA increased continuously upto 37 weeks of GA and showed a significant positive correlation with myelin basic protein (MBP) immunostained fibres.

The immunohistochemical data demonstrated the temporal changes in the expression of different markers *i.e.* GFAP, NSE in the cerebellar cortical region and MBP in the cerebellar white matter of the human fetal brain ranging from 20 to 37 weeks respectively. It was found that in the cerebellar cortex, the intensity of GFAP expression was maximum at 28 weeks GA while diffuse lower intensity staining was observed in fetuses at 32 and 37 weeks GA. The percentage of NSE positive cells showed an increasing trend from 20 weeks onwards in the internal granular layer of the cerebellar cortex and was found to be maximum at 37 weeks. In the MCP, at 20 and 24 weeks GA, the percentage of MBP positive fibres was minimum while at 28 weeks GA the percentage of MBP fibres increased which continued till the late third trimester of gestation.

It was conclusively demonstrated that DTI can be used to assess the migrational and maturation changes during the development of the human fetal cerebellum and these findings are supported by the immunohistochemical analysis. This confirms that DTI has the ability to monitor the neuronal migratioin and maturation processes noninvasively *in vivo*, and may improve our understanding of the normal developmental pattern of cerebellar cortical gray matter and cerebellar white matter.

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Publications

1. Saksena, S., Husain, N., Malik, G.K., Trivedi, R., Sarma, M., Rathore, R.K.S., Pandey, C.M. and Gupta, R.K. Comparative evaluation of the cerebral and cerebellar white matter development in pediatric age group using quantitative diffusion tensor imaging. *Cerebellum 7*: 392, 2008.
2. Saksena, S., Husain, N., Das, V., Pradhan, M., Trivedi, R., Srivastava, S., Malik, G.K., Rathore, R.K.S., Sarma, M., Pandey, C.M. and Gupta, R.K. Diffusion tensor imaging in the developing human cerebellum with histologic correlation. *J Develop Neuros 26*: 705, 2008.
3. Trivedi, R., Gupta, R.K., Husain, N., Rathore, R.K.S., Saksena, S., Srivastava, S., Malik, G.K., Das, V., Pradhan, M., Sarma, M.K., Pandey, C.M. and Narayana, P.A.. Region-specific maturation of cerebral cortex in human fetal brain: Diffusion tensor imaging and histology. *Neuroradiol 51* : 567, 2009.

ICMR NEWS

The following meetings of various technical committees/ groups of the Council were held during February-March, 2010

Meetings of Scientific Advisory Group (SAG)

SAG of the Division of Epidemiology and Communicable Diseases	March 18-19, 2010

Meetings of Task Forces (TFs)/Project Review Committees/Groups(PRCs/PRGs)

TF on Asthma	February 1, 2010
PRC on Cellular and Molecular Biology	February 15, 2010
PRC on Urology and Nephrology	February 25, 2010
PRC on North-East Project of the Division of ECD	February 25, 2010
PRG (Overseas) on Cardiology	February 26, 2010
PRC on Gastroenterology	March 5, 2010
PRC on North-East Projects	March 8, 2010
PRC on Oncology and Pathology	March 11-12, 2010

PRC on Geriatrics	March 15, 2010
PRC on Biochemistry, Immunology & Allergy	March 22-23, 2010
PRC on Mental Health	March 29, 2010
PRC on Environmental Hygiene and Occupational Health	March 29, 2010

Meetings of Expert Groups/Committees (EGs/ECs)/ Steering Committees (SCs)/High Powered Committees

EC on Treatment of Osteoarthritis using Quantum Magnitude Measures	February 9, 2010
ICMR-DBT Joint EG to Develop Road Map For Stem Cell Research and Therapy	February 16, 2010
EG for Setting up Population Based Cancer Registry at Muktasar and Bhatinda	February 22, 2010
SC on Jai Vigyan Mission Mode Project on RF/RHD	March 3, 2010
High Powered Committee on Global Environmental Changes and Health	March 4, 2010
EG on Genomic Analysis of MHC Genes (HLA and Non-HLA) in Type 1 Diabetes in Indian Population	March 26, 2010

Workshop

An Indo-European Workshop on Cancer and Neurosciences was held at the ICMR Headquarters, New Delhi during February 18-19, 2010.

Participation of ICMR Scientists in Scientific Events

Dr. Neena Valecha, Scientist F, National Institute of Malaria Research (NIMR), New Delhi, participated in the WHO Meeting on A Strategy for the Containment of Artemisinis Tolerant Parasites in South-East Asia, at Hanoi (February 2-4, 2010).

Dr. Pradeep Das, Director, Rajendra Memorial Research Institute of Medical Sciences, Patna, participated in the Meeting on Development of a DNA Vaccine for Visceral Leishmaniasis, at Tunis-Belvedere (February 3-5, 2010).

Dr. V. Kumaraswami, Scientist F and Officer-in-Charge, Tuberculosis Research Centre (TRC), Chennai, participated in the XIV Technical Evaluation Reference Group (TERG) Working Group Meeting at Geneva (February 8-9, 2010).

Dr. K. Madhavan Nair, Scientist E, National Institute of Nutrition (NIN), Hyderabad, participated in the Meeting on Biomarkers for Nutrition and Development: Building a Consensus, at Vienna (February 8-10, 2010).

Dr. K.D. Ramiah, Scientist F, Vector Control Research Centre (VCRC), Puducherry, participated in the Technical Advisory Group Meeting and Research Question Workshop on Lymphatic Filariasis at Liverpool (February 9-10, 2010). He also participated in the Workshop on Urban MDA for Lymphatic Filariasis and other Neglected Diseases, at Georgia (March 2-5, 2010).

Dr. Ashwini Kumar, Scientist E and Officer-in-Charge, NIMR Field Station, Goa, participated in the II Annual Meeting of Asia Pacific Malaria Elimination Network, at Kandy (February 16-19, 2010).

Dr. P.A. Menon, Scientist D, TRC, Chennai, participated in the XVII Conference on Retroviruses and Opportunistic Infections, at San Francisco (February 16-19, 2010).

Dr. S.M. Mehendale, Scientist F, National AIDS Research Institute (NARI), Pune, and Dr. Samiran Panda, Scientist E, National Institute of Cholera and Enteric Diseases (NICED), Kolkata, participated in the Impact Evaluation Workshop on Evaluating the Impact of Development Programmes: Turning Promises into Evidence, at Kathmandu (February 22-26, 2010). Dr. Mehendale also participated in the Consultation of HIV Methodology Experts to discuss Changes in the Testing Algorithms for the Proposed CONARD Sponsored. Preoperative Sites for

Effectiveness Trials of Microbicides in India, at Orlando (March 26, 2010).

Dr. Sujala Kapoor, Scientist E, Institute of Pathology (IOP), New Delhi, participated in the VI Annual Conference of the Organization for Oncology and Translational Research, at Kyoto (February 26-27, 2010).

Dr. Sheela Godbole, Scientist D, NARI, Pune, participated in the CDC Asia Regional Surveillance Meeting, at Ho chi Minh City (March 5, 2010).

Dr. R. P. Gangakhedkar, Scientist E, NARI, Pune, participated in the XII Regional Advisory Panel for Asia and the Pacific for Sexually Transmitted Infection, at Seam Reap, Cambodia (March 8-12, 2010).

Dr. U.D. Gupta, Scientist E, National JALMA Institute for Leprosy and Other Mycobacterial Diseases (NJIL&OMD), Agra and Dr. B. Borkakoty, Scientist C, Regional Medical Research Centre (RMRC), Dibrugarh, participated in the XIV International Conference on Infectious Diseases, at Miami (March 9-12, 2010).

Dr. Seema Sahay, Scientist D, NARI, Pune, participated in the Annual MTN CWG Meeting, at Washington, D.C. (March 14-17, 2010).

Dr. Alamelu Raja, Scientist F, TRC, Chennai, participated in the Workshop on Basic Research for Tuberculosis, at Bethesda (March 18-19, 2010).

Dr. Deepa Bisht, Scientist C, NJIL&OMD, Agra, participated in the III PepCon-2010 Congress, at Beijing (March 21-23, 2010).

Dr. M.V. Murhekar, Scientist F, National Institute of Epidemiology, Chennai, participated in the Symposium on Ethical Challenges in the Pandemic Influenza in Asia, at Hanoi (March 21-26, 2010).

Dr. S.K. Sharma, Scientist E, and Officer-in-Charge, NIMR, Field Station, Rourkela, participated in the WHO/TDR III Meeting of Principal Investigators and IV Meeting of Scientific Advisory Committee on Innovative Vector Control Interventions at Geneva (March 22-25, 2010).

Dr. Poonam Salotra, Scientist E, IOP, New Delhi, participated in the WHO Expert Committee Meeting on Leishmaniasis Control Programme, at Geneva (March 22-26, 2010).

Dr. J.M. Deshpande, Director, Enterovirus Research Centre, Mumbai, participated in the (i) Ad hoc Small Working Group Discussion on Development and Evaluation of New Diagnostic Reagents and Approaches to Testing; and (ii) Meeting on Bio-safety at Hertfordshire (March 23-25, and 26, 2010 respectively).

Dr. V.D. Ramanathan, Scientist F, TRC, Chennai, and Dr. Beenu Joshi, Scientist E, NJIL&OMD, Agra, participated in the II Annual International Congress of Antibodies -2010, at Beijing (March 24-26, 2010).

Dr. R.S. Paranjape, Director, NARI, Pune, participated in the Signature Interdisciplinary Programme in Allergy, Immunology and Infectious Diseases IV Annual Symposium at South Florida (March 25-26, 2010).

Trainings/Fellowships

Dr. P.S. Sathe, Scientist D, NIV, Pune, participated in a Training in Arbovirus Surveillance Techniquest, at Colorado (March 1-12, 2010).

Dr. C. Suresh, Scientist C, NIN, Hyderabad, proceeded on a Visiting Research Scientist Fellowship at Savannah State University, USA for 2 years w.e.f. March 1, 2010.

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