KIMS HOSPITAL

KIMS

An eventograph of academic pursuit

25 YEARS

Department of Community Medicine

RABIES

1986 — 2011

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RABIES

An eventograph of 25 years of academic pursuit (1986 to 2011)

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WORLD HEALTH ORGANIZATION
ORGANISATION MONDIALE DE LA SANTE
Office of the Director, Department of Neglected Tropical Diseases (NTD)
Cluster HIV/AIDS, Malaria, Tuberculosis and Neglected Tropical Diseases (HTM)
WHO Headquarters, Geneva, Switzerland.

Geneva, 14 February, 2011

According to our records the Department of Community Medicine, KIMS, Bangalore, India started working on rabies by establishing a animal bite treatment center in 1986. The World Health Organization's team responsible for rabies became aware of KIMS involvement in rabies clinical research relatively early on as WHO had always been interested in technically supporting clinicians and researchers with a keen interest in rabies prevention and control from a country which was estimated to carry more than 60 % of the health and economic burden of rabies of all Asian countries.

A closer relationship with KIMS developed in the early 2000 when Dr. M. K. Sudarshan and his team became very much involved with leading the Association for Prevention and Control of Rabies in India (APCRI) and its registered office being in KIMS. The collaboration between WHO and KIMS became closer and in the early 2003 the APCRI and Department of Community Medicine, KIMS were requested to conduct a WHO sponsored survey on the incidence of rabies in the whole of India whose final results were published in 2007 in the International Journal of Infectious Diseases.

In 2005 WHO participated in the meeting near Mumbai that led to the creation of the Rabies in Asia (RIA) Foundation with Dr. M. K. Sudarshan from KIMS as its President and its office located in KIMS. In 2007 the RIA Foundation supported by staff from KIMS organized the first Rabies in Asia Conference in Bangalore modeled on the annual rabies conferences held in the Americas. WHO was invited to give an inaugural speech on the occasion of the first RIA conference. Through the office of RIA Foundation the 2nd RIACON was held in 2009 at Hanoi,Vietnam and under the leadership of Dr. M. K. Sudarshan his colleagues Dr. D. H. Ashwath Narayana and others worked for its success.

As a conclusion the working relationship between WHO and KIMS under its different initiatives for rabies prevention and control in India primarily and in Asia as a whole have been very close and successful over many years. We are convinced that KIMS has contributed a lot to the currently reported improvement of the human rabies situation in India.

Dr François-Xavier Meslin,
Team Leader - Neglected Zoonotic Diseases (NZD)
WHO Headquarters, Geneva, Switzerland.

Foreword

Dr. R.L. Ichhpujani
Additional Director

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FOREWORD

Department of Community Medicine at Kempegowda Institute of Medical Sciences (KIMS), Bangalore has made very significant contributions in the filed of control of Rabies in India over the past quarter of a century under the able guidance and leadership of Dr. M.K. Sudarshan, Dean/Principal and Professor of Community Medicine, KIMS. The new initiatives and quantum of work carried out by this institute in the field of Rabies can be well appreciated on perusal of this publication.

Documenting the work done inspires the future generations and Prof. M.K. Sudarshan deserves appreciation for this initiative. His able and friendly leadership has been able to develop very cordial relationships with other Institutions engaged in similar work such as NIMHANS Bangalore, IPM Hyderabad, NCDC, Delhi, APCRI and WHO to name a few. His team of dedicated professionals deserves appreciation.

I am very optimistic that this publication shall inspire the future researchers/workers in the field of rabies in the country in general and at KIMS, Bangalore in particular.

(R.L. Ichhpujani) 10.02.2011

Dated: 10.02.2011

Preface

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Date: 09-02-2011

The department of community medicine is working in the area of rabies since 1986 for twenty five years. Recently when personally reflecting I noticed that there was no document/record to show all the works done and accomplishments made in this period. Hence, at my behest a team of faculty comprising of Drs. D. H. Ashwath Narayana, Gangaboraiah, N. R. Ramesh Masthi and H. S. Ravish ventured into preparing this eventograph on rabies.

Personally speaking my entry into rabies work was accidental following an event which lead to the establishment of the first anti rabies clinic in May, 1986 in Jayanagar General Hospital, Bangalore. Later, in these twenty five years many persons from different walks of life, spheres of work and in various capacities have supported this endeavor. The dedicated and sincere efforts of the faculty and staff of the department, the unstinting support of students and colleagues and the patronage of the management of the institute are largely responsible for the accomplishments made. A long list of acknowledgements included in this book should suffice to express our grateful thanks to all those who have helped us throughout. The younger generation particularly the post graduate students of community medicine may draw some lessons from this experience. It is sincerely hoped that the legacy of work done till now will be carried forward in to the future.

M.K. Sudarshan

Dr. M. K. Sudarshan, MD, FAMS, Hon. FFPH (UK)
Dean/Principal and Professor of Community Medicine,
KIMS, Bangalore – 560 070.

Acknowledgements

We sincerely acknowledge the help and support of the following Individuals/ Organizations & Institutions:

- Dr. Francois-Xavier Meslin, Team Leader, Neglected Zoonotic Diseases, World Health Organization (WHO), Geneva, Switzerland.
- Dr. Derek Lobo, Dr. Rajesh Bhatia, Dr. G.N. Gongal and others from WHO – SEARO, New Delhi.
- Dr. Deborah Briggs, Executive Director, Alliance for Rabies Control, USA.
- Ministry of Health & Family Welfare, Government of India.
- Dr R. L. Ichhpujani, Dr Veena Mittal, Dr Mala Chhabra and others from National Center for Disease Control (NCDC), Delhi.
- Dr. S. N. Madhusudana, Additional Professor of Neurovirology and his team from National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore.
- Former Directors of Pasteur Institute of India (PII), Coonoor, Tamilnadu viz Dr. S. Kalyanaraman, Dr. V. L. Pundit, Dr. G. S. Prasad Rao, Dr. Uday Bhaskar Rao and Dr. Rao Bhau; Mr. S. Ganeshan, Administrative Officer; Mr. C. Palaniappan, Senior Research Officer, PII Coonoor; National Institute of Virology (NIV), Pune.
- Ministry of Health & Family Welfare, Government of Karnataka.
- Present and Past office bearers and Directors of Vokkaligara Sangha, Bangalore.
- Trustees & Advisors of Rabies in Asia (RIA) Foundation.
- Office bearers (Past & Present) of Association for Prevention and Control of Rabies in India (APCRI).
- The Officers bearers of Karnataka Association of Community Health (KACH) and Indian Public Health Association (IPHA).
- Former Deans of Government Veterinary college, Hebbal, Bangalore, Dr. S. Abdul Rahman, Dr. Yathiraj, Professors of Pathology Dr. Vijayasarathy, Dr. M. L. Sathyanarayana , other faculty and students.
- Chief Health Officers of Bruhat Bangalore Mahanagara Palike (BBMP) – Dr. Siddegowda, Dr. Susheela Shekhar, Dr. Thandava Murthy, Dr. Lokesh, Dr. L T Gayathri & Medical Officers.
- BBMP Commissioner: Sri. K. Jairaj and Joint Commisioners: Sri. Manu Baligar & Sri. Kulkarni.

- Dr. Sumedha Desai, Director of Health Services, Government of Karnataka & Former Directors of Health Services: Dr. J. L. Javaregowda, Dr. C. Prasanna Kumar, Dr. (Capt.) V. G. Shetty & Dr. Murugendrappa.
- Medical Superintendents of Epidemic Disease Hospital: Drs. Paramashivaiah G B, T. C. Sitaram, Thimma Reddy & Others
- Medical Superintendents of Jayanagar General Hospital: Dr. A. R. Ramachandra, Dr. T. C. Sitaram; Pediatricians : Dr. Narayan Shetty, Dr. Sanathana Murthy and other staff.
- Former Principals of KIMS: Drs G. Ramegowda, B. Mariappa, Dr. Appaji Gowda, L. S. Boregowda, L. Krishna & former Medical Superintendents of KIMS Hospital, Dr. S. Vasanthakumar; Former Administrative Medical Officer of KIMS Hospital Dr. J. Ramachandra.
- Former Professors of Community Medicine, KIMS: Dr. A. N. Arumugam, Late Dr. D. P. Narasimha Murthy and Dr. D. R. Siddegowda.
- Dr. N S N Rao, Professor of Statistics, Center for Research in Health and Social Welfare Management, Bangalore.
- Doordarshan, All India Radio, Print Media, Bangalore.
- Film industry with special regards to Mr. P. H. Vishwanath, Director, Mr. Ganesh, Master Manjunath, Cine Actors and Mr. Gurumurthy, Editor, Mediatherapy.
- Sports celebrities: Sri. Rahul Dravid and Sri. VenkateshPrasad .
- Office bearers of Stray Dog Free Bangalore (SDFB), Bangalore
- Animal Welfare Organizations – Karuna animal welfare association of Karnataka (KARUNA), Compassion unlimited plus action (CUPA) and Animal Rights Fund (ARF).
- Pharmaceutical Companies: Serum Institute of India Limited, Sanofi Pasteur, Novartis Vaccines, Zydus Cadila, Bharat Biotech International Limited, Bharat Serums and Vaccines Ltd., Ranbaxy Pharma, Human Biologicals Institute, Synergy Diagnostics Pvt. Ltd., VINS Bioproducts limited.
- Staff of KIMS Hospital, Interns and Students of KIMS, Bangalore.
- Staff, Post graduate students of Department of Community Medicine, KIMS.
- Dr. Ajay Hegde, Web Master, Bangalore
- Patients, Research volunteers, Relatives, Friends and Public at large.

Any name left out is purely inadvertent

Abbreviations & Acronyms

ABC	-	Animal Birth Control.
APCRI	-	Association for Prevention and Control of Rabies in India.
ARC	-	Anti Rabies Clinic.
CVA	-	Commonwealth Veterinary Association.
dRIT	-	Direct Rapid Immuno histo-chemical Test.
GARC	-	Global Alliance for Rabies Control.
HDCV	-	Human Diploid Cell Vaccine.
IDRV	-	Intra Dermal Rabies Vaccination.
IPHA	-	Indian Public Health Association.
KACH	-	Karnataka Association of Community Health.
KAP	-	Knowledge, Attitude & Practice.
KIMS	-	Kempegowda Institute of Medical Sciences.
MIMS	-	Mandya Institute of Medical Sciences
NIMHANS	-	National Institute of Mental Health and Neurosciences.
NTV	-	Nerve Tissue Vaccine.
PCEC	-	Purified Chick Embryo Cell vaccine.
PVRV	-	Purified Verocell Rabies Vaccine.
PDEV	-	Purified Duck Embryo Vaccine.
RIA	-	Rabies in Asia.
RIGs	-	Rabies Immunoglobulin.
TRC	-	Thai Red Cross
WHO	-	World Health Organization.

1. Starting of Anti rabies clinic

The Department of Community Medicine is one of the Para-clinical Departments of Kempegowda Institute of Medical Sciences (KIMS), a private medical college recognized by the Medical Council of India, New Delhi and is affiliated to the Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka State, India. It was established on 1st April, 1981. The objective of this Department is to provide a high quality training in Community Medicine to the under graduate medical students enrolled for MBBS (basic medical degree) and post graduate medical students enrolled for MD (Community Medicine). The other activities of the Department are to conduct research, training programs and provide promotive, preventive and curative health services to the community.

The Anti rabies clinic (ARC) was first started in Government run Jayanagar General Hospital, Bangalore in May, 1986 by the Department of Community Medicine, KIMS. The animal bite victims were administered nerve tissue vaccine (NTV) procured from Vaccine Institute, Belgaum, Karnataka through Department of Health & Family Welfare, Government of Karnataka. The ARC was functioning from 09.00 AM to 04.00 PM from Monday to Friday and from 9.00 AM to 1.00 PM on Saturday, Sunday and General Holidays.

Jayanagar General Hospital (JGH), Bangalore

Anti Rabies Clinic, JGH, Bangalore in 1986

The first clinical trial with anti rabies vaccine viz. Kaketsuken (PCEC vaccine, marketed by Serum Institute of India, Pune) was conducted in this ARC by the Department of Community Medicine, KIMS during 1993-94.

Subsequently, another anti rabies clinic was started in KIMS Hospital & Research Center, Bangalore in Preventive & Social Medicine Unit in 1993. Many phase III and Phase IV clinical trials with modern rabies vaccines were conducted in this ARC, from 1993 till 2003.

ARC, Preventive & Social Medicine (P&SM) unit, KIMS Hospital in 1993

The ARC was later shifted to new OPD block of KIMS Hospital in 2004 & is fully equipped to conduct the clinical trials with rabies Immunobiologicals (both anti rabies vaccines & rabies immunoglobulins).

KIMS Hospital & Research Center

Preventive Medicine Unit (PMU)

ARC, KIMS Hospital & RC

Blood sampling from a clinical trial subject

Anti rabies clinic, KIMS Hospital & Research Centre is a tertiary referral center for administration of rabies immunoglobulins (RIGs). The Department of Community Medicine, KIMS also has an epidemiological surveillance center for rabies.

Many rabies experts have visited ARC, KIMS hospital and appreciated the work done and also recommended further improvements.

Dr. F. - X. Meslin, WHO, Geneva (3rd from left) **at ARC, KIMS in 2003**

Dr. Henry Wilde, Thailand (2nd from left) **and Dr. Betsy Miranda, Philippines** (4th from left) **at ARC, KIMS in 2007**

Dr. Herve Boury, France (2nd from left), **Dr. F. - X Meslin, WHO, Geneva** (3rd from left) **and Dr. D. Briggs, USA,** (5th from left) **at ARC, KIMS in 2007.**

Dr. Naseem Salahuddin, Pakistan with Dr. M.K. Sudarshan at ARC, KIMS in 2007

Dr Deborah Briggs, USA (2nd from left) **at ARC, KIMS in 2010**

2. Sponsored Projects and Clinical trials

1994

1) Clinical evaluation of safety & immunogenicity of PCEC rabies vaccine (Kaketsuken) in post exposure treatment sponsored by Serum Institute of India, Pune ; Principal Investigator: Dr. M. K. Sudarshan.

1996

2) Clinical evaluation of safety and efficacy of PVRV (Verorab) in post exposure treatment during pregnancy sponsored by Pasteur Merieux Connaught, France; Principal Investigator: Dr. M. K. Sudarshan.

1999

3) Clinical evaluation of safety and immunogenicity of Rhesus Diploid Rabies Vaccine (RDRV) In man, Sponsored by Serum Institute of India , Pune; Principal Investigator: Dr. M. K. Sudarshan.

2001

4) A phase III, open, comparative clinical trial to assess the safety and immunogenicity of Human Diploid Cell Vaccine (HDCV) (Adsorbed) manufactured by SII, Pune with standard commercially available HDCV rabies vaccine, Sponsored by Serum Institute of India, Pune; Principal Investigator: Dr. M. K. Sudarshan.

2002

5) A phase III, open, comparative clinical trial to assess the safety and immunogenicity of Human Diploid Cell Vaccine (HDCV) (Lyophilized-Pittman Moore strain) manufactured by SII, Pune with standard commercially available HDCV (Lyophilized) of Aventis Pasteur in post exposure treatment sponsored by Serum Institute of India, Pune; Principal Investigator: Dr. M. K. Sudarshan.

2004

6) A phase IV, open, comparative clinical trial to assess the efficacy of Human Diploid Cell rabies Vaccine (Adsorbed) with that of standard commercially available Human Diploid Cell rabies Vaccine (Lyophilized)

in post exposure rabies treatment Sponsored by Serum Institute of India, Pune; Principal Investigator: Dr. M. K. Sudarshan.

7) A phase IV, open, comparative clinical trial to assess the efficacy of Human Diploid Cell rabies Vaccine (Lyophilized) with that of standard commercially available Human Diploid Cell rabies Vaccine (Lyophilized) in post exposure Rabies treatment Sponsored by Serum Institute of India, Pune; Principal Investigator: Dr. M. K. Sudarshan.

8) A phase IV, post marketing surveillance study to assess the immunogenicity and reactogenicity of Human Diploid Cell rabies Vaccine (Adsorbed, Rabivax) manufactured by Serum Institute of India, Pune, Sponsored by Serum Institute of India, Pune; Principal Investigator: Dr. M. K. Sudarshan.

9) An open label, Phase IV, comparative clinical trial to assess the safety and efficacy of Human Diploid Cell rabies Vaccine (liquid) (Rabivax) with Purified Chick Embryo Cell (PCEC) rabies vaccine (Rabipur) Sponsored by Serum Institute of India, Pune; Principal Investigator: Dr. M. K. Sudarshan.

2005

10)A multicenter study to assess the safety & immunogenicity of Vaxirab in post-exposure cases, Sponsored by Cadila Healthcare Ltd, Ahmedabad; Principal Investigator: Dr. B. J. Mahendra.

11)A multicenter study to assess the safety and immunogenicity of Vaxirab Vs Lyssavac N Berna in simulated post-exposure prophylaxis Sponsored by Cadila Healthcare Ltd, Ahmedabad; Principal Investigator: Dr. B. J. Mahendra,

12)A phase IV, single center, randomized, open-label, parallel group immunogenicity and reactogenicity study in healthy volunteers, comparing PCEC(Rabipur) administered intradermally at two sites in a dose of 0.1ml per site or PCEC administered intramuscularly at a dose of 1.0ml, both on 0,3,7,14,28 (Essen post-exposure scheme), Sponsored by Chiron vaccines, Germany; Principal Investigator: Dr. M. K. Sudarshan

2007

13)A multi centre, phase III, randomized, double blind comparative study to evaluate the safety & immunogenicity of rabies vaccine (Indirab) in

animal bite cases- An equivalence trial sponsored by Bharat Biotech International Ltd, Hyderabad; Principal Investigator : Dr. B. J. Mahendra.

14) Clinical evaluation of safety & immunogenicity of purified chick embryo cell rabies vaccine administered intradermally using updated TRC regimen (2-2-2-0-2) in animal bite cases. Sponsored by Novartis Vaccines, Mumbai, India; Principal Investigator: Dr. D. H. Ashwath Narayana.

2008

15) Clinical evaluation of safety & immunogenicity of Indirab & Verorab vaccines using updated Thai Red Cross regimen in healthy volunteers: Phase III, Randomized Clinical Study. sponsored by Bharat Biotech International Ltd, Hyderabad, Principal Investigator: Dr. D. H. Ashwath Narayana.

16) A comparative multi centre study to assess the immunogenicity and safety of PDEV (Vaxirab) versus PCEC Vaccine (Rabipur) and PVRV (Verorab) in post exposure cases sponsored by Cadila Healthcare Ltd, Ahmedabad; Principal Investigator: Dr. D. H. Ashwath Narayana.

2009

17) An open label study to assess the safety & immunogenicity of PCEC^{PM} vaccine administered intramuscularly using Pre exposure vaccination in healthy volunteers. sponsored by Cadila Healthcare Ltd, Ahmedabad; Principal Investigator: Dr. D. H. Ashwath Narayana.

18) An open label study to assess safety & immunogenicity of PCEC^{PM} vaccine administered intramuscularly using simulated post exposure prophylaxis sponsored by Cadila Healthcare Ltd, Ahmedabad; Principal Investigator: Dr. D. H. Ashwath Narayana.

19) Adopt a Village – A Rural Rabies Prevention Project, Sponsored by Global Alliance for Rabies Control (GARC); Advisor:Dr M K Sudarshan, Project coordinator : Dr. D. H. Ashwath Narayana, Project officer (Medical):Dr. N. R. Ramesh Masthi.

2010

20) An open label, multi centric study to assess safety & iImmunogenicity of PCEC^{PM} vaccine administered intramuscularly using PEP in animal

bite cases sponsored by Cadila Healthcare, Ahmedabad; Principal Investigator: Dr. D. H. Ashwath Narayana.

21) Clinical evaluation of safety & immunogenicity of PCEC^{PM} vaccine administered intradermally using Updated TRC regimen in healthy volunteers sponsored by Cadila Healthcare, Ahmedabad; Principal Investigator: Dr. D. H. Ashwath Narayana.

22) Comparative study to assess the safety & Immunogenicity of PCECV & PVRV rabies vaccines administered intradermally using new one week regimen (4-4-4-0-0) in healthy volunteers; Sponsored by Rabies in Asia- India Chapter; Principal Investigator: Dr. D. H. Ashwath Narayana.

Adopt a village- A rural rabies prevention project.

Adopt a village- A rural rabies prevention project is sponsored by Global Alliance for Rabies Control (GARC), Rabies in Asia (RIA) Foundation & Commonwealth Veterinary Association (CVA).

The medical component of the project is implemented by Department of Community Medicine, Kempegowda Institute of Medical Sciences (KIMS). The Veterinary component is being implemented by Department of Veterinary Pathology, Veterinary College, Hebbal, Bangalore & Laboratory component by the Department of Neurovirology, National Institute of Mental Health & Neurosciences (NIMHANS). The project is implemented in 6 villages in Bangalore South Taluk. The study villages are Kumbalgodu, Tagachakuppe, Gerupalya and control villages are Ramohally, Vinayaknagar & Bhimankuppae. The project duration is for 2 years (1st December, 2009 to 31st November, 2011).

The following activities were conducted under the project:

1) Baseline survey of households for assessing knowledge, attitude & practice on rabies was conducted jointly by both medical & veterinary doctors in the study and control villages. The medical & veterinary questionnaire was developed by the medical & veterinary experts and pretested in the field.

2) Health education materials on rabies prevention were developed based on the findings of the baseline KAP survey. The following were developed and used for the various health education activities -

Training chart used by rabies volunteers in the study villages for educating people

Poster on “Rabies post exposure prophylaxis"

Poster on “Responsible pet ownership"

Snake & Ladder game for rabies prophylaxis and education of school children

Calendar for the year 2011 carrying messages on rabies prevention (12 sheets with photos) was distributed to all households in the study villages.

Video film on rabies in local language was produced and being shown in the local TV channels in the study villages regularly.

Rabies prevention education was disseminated through professional folk dance performers (Kamsale Kunitha).

Wall paintings regarding Project activities & key rabies messages in the study villages.

3) Training on use of dRIT (Direct rapid immuno histo-chemical test) for rabies diagnosis was conducted for veterinary professionals from veterinary college & veterinary hospitals.

4) Surveillance for human & animal rabies in the project area has been started. Both Medical & Veterinary personals in the study villages were oriented to the project. Data is being collected on incidence of human & animal rabies. dRIT testing of animal brain samples from the study villages were tested for rabies by the Pathologist from Veterinary college and validated at WHO collaborating center for reference & research on rabies at NIMHANS, Bangalore.

5) Surveillance for animal bite cases has been started with data collection from private medical practitioners, Government and private hospitals. The animal bite cases from the study villages are being treated as per WHO recommendation.

6) Data is being collected on live stocks in the project villages. The animal welfare activity consisting of vaccinating the dogs with Inj. Nobivac-R (Donated by Intervet), deworming of the dogs with Tablet Plozin / Inj Ivermectin with collaring of the dogs was done in the study villages with the help of Karuna Animal Welfare Association of Karnataka, Bangalore which is a registered NGO with Animal Welfare Board of India (AWBI).

7) Serological surveillance: 2 mL blood was collected from dogs which were vaccinated and sera sent to WHO Collaborating center, NIMHANS, Bangalore for estimation of RvnAb titers.

8) Pre exposure rabies vaccination of school children and other risk groups is provided by intradermal vaccination using PCEC vaccine.

On 13th November, 2010, Dr. Deborrah J Briggs, Executive Director, Alliance for Rabies Control (ARC), USA reviewed the project activities at the completion of 1st year of the project. She visited 3 project villages in the forenoon and participated in the Joint appraisal meeting in the afternoon at KIMS, Bangalore.

Children playing Snake & Ladder game

Intra dermal rabies vaccination (IDRV)

Inauguration of joint appraisal meeting

Dr. Deborah Briggs, Executive Director, Alliance for Rabies Control (ARC) delivering the talk

3. Epidemiological studies

1992

1) An Epidemiological study of rabies in Bangalore city, sponsored by Karnataka state council for science and technology (KSCST), Bangalore; Principal Investigator: Dr. M. K. Sudarshan.

2001

2) A community survey of rabies, anti rabies treatment and dog population in Bangalore city, an initiative of PSBH, Principal Investigator: Dr M K Sudarshan.

2003

3) Assessing Burden of Rabies in India, WHO sponsored National Multi-Centric Rabies Survey-2003. Chief investigator: Dr M K Sudarshan.

2007

4) Performance Audit of Animal Birth Control (ABC) programme in Bangalore city, May 2007. Principal Investigator: Dr. M K Sudarshan.

Dr. S. Yathiraj, Professor of Veterinary Medicine and Dr. D. H. Ashwath Narayana, Associate Professor of Community Medicine, KIMS along with staff of Veterinary hospital at the cantonment OT, Bangalore, during audit of ABC programme.

2008

5) Reassessing the Rabies free status of Andaman and Nicobar Islands, India, Sponsored by RIA Foundation.

4. Publications

1) **M K Sudarshan, Savitha Nagaraj, B Savitha, S G Veena (1995): An epidemiological study of rabies in Bangalore city, Journal of Indian Medical Association, Vol. 93, No 1, 14-17.**

   This multi centric study was conducted with the aim of knowing the nature and magnitude of the problem of rabies in Bangalore city. The disease was enzootic and endemic and the principal reservoir of infection was dog. There was stray dog menace due to ineffective dog control measures. Nearly 30% of animal bite victims did not wash their wounds and about 60% of patients started anti rabies vaccine late after 24 hours of bite. The antirabies serum (equine) was not available at all. The victims of hydrophobia were both children (37.5%) and adults (62.5%) and the average incubation period ranged from 35-111 days. Pre-exposure anti rabies vaccination was not given to dog catching and dog pound staff. Lastly, there was a lack of proper laboratory diagnostic facilities for rabies in Bangalore.

2) **M K Sudarshan (1995): A study of anti rabies treatment practices by private medical practitioners in Bangalore City, Indian Journal of Preventive and Social Medicine, Vol. 26, 182.**

3) **M K Sudarshan (1995): Editorial on Rabies in India, Indian Journal of Preventive and Social Medicine (July-Dec).**

4) **M K Sudarshan, S. Bharadwaj, J M Mehta, B G Parasuramalu, B J Mahendra, Gangaboraiah (1995): Cross validation of RFFIT & ELISA results in vaccinees following PCEC-Japan (Kaketsuken) Post exposure Rabies prophylaxis, Indian J of Com Health 1 : 81-82.**

   To evaluate the immunogenic efficacy of antirabies vaccine, World Health Organization recommends estimation of protective antibody titer ($\geq$ 0.5 IU/mL is protective titer) by RFFIT or MNT (Mouse Neutralization Test). As RFFIT is a highly sophisticated test and MNT is a time consuming and tedious procedure involving mice inoculation, as an alternative ELISA kits (non bio – hazardous, safer) which are easier to use are now commercially available. In this background, as a part of phase III vaccine trial of PCEC- Japan (Kaketsuken) the sera from

vaccinees was collected in duplicate, coded and analyzed for RFFIT & ELISA at two different centers (Coonoor, Tamil Nadu & Bombay) independently. The differences between the results of the two tests were significant ($p < 0.001$) except for day 100 serum collection ($p > 0.1$). However, a further scrutiny of RFFIT & ELISA results for individual serum sample did not reveal obvious gross difference. The RFFIT was done at a premier WHO centre by a trained person. Consequently for actual validation of immunogenicity of the vaccine, a result of this test was used for assessing the efficacy. Besides, as the overall results of RFFIT was higher than ELISA, RFFIT being a WHO approved test it would be prudent to use RFFIT or alternatively MNT. Only in the absence of these two tests the ELISA test may be considered.

5) **M K Sudarshan, S. Bharadwaj, J M Mehta, B G Parasuramalu, B J Mahendra, Gangaboraiah (1996): Clinical evaluation of safety and efficacy of PCEC rabies vaccine (Kaketsuken) in post exposure treatment, Indian J Maternal and Child Health: 7 (2): 49-52.**

A clinical study was conducted on 25 patients with a history of animal bite, to assess the safety and efficacy of a new PCEC Rabies Vaccine (Kaketsuken) in post-exposure treatment. The bites were classified by CRI, Kasauli. Classification and vaccine administered as per the Essen protocol. Antibody titers were determined by RFFIT test on day 0, 14, 90 and 100. This study revealed that Kaketsuken vaccine is safe and immunogenic as all patients (100%) showed sero conversion over the protective titer of 0.5 IU per ml from day 14 to day 180. In class III bites, a sixth dose of vaccine on day 90 significantly ($p < 0.001$) increased antibody titer on day 100, which was sustained till day 180. The ADR profile of the Kaketsuken vaccine was comparable to other tissue culture vaccine. It is recommended that potency of the vaccine be increased from its present 2.7 IU to 5 to 7 IU per ml, comparable with other tissue culture vaccines available in India.

6) **M K Sudarshan, S N Madhusudana, B J Mahendra (1999): Post exposure prophylaxis with purified verocell rabies vaccine during pregnancy – safety and immunogenicity, J. of Communicable Diseases: 31(4), 229-236.**

This study was conducted with the main objective of determining the

safety and immunogenicity of purified verocell rabies vaccine (PVRV) during pregnancy. Twenty nine pregnant women exposed to rabies were vaccinated with PVRV as per the Essen regimen advocated by World Health Organization. None of the women experienced any adverse side effects to the vaccine. The intrauterine growth and development monitored by ultrasound examination was found to be normal and the outcome of pregnancy was satisfactory. There were no congenital anomalies in any of the infants born and they were healthy and had normal growth and development during the one year follow –up period. The rabies neutralizing antibody titers from day 14 to day 365 following vaccination in these women were adequate and well above the minimum protective level of 0.5 IU/ml of serum. Protective levels of antibodies were also present in serum of some of the babies tested, for up to 3 months of age. The mothers and infants followed for one year period were doing well at the end of the study period. Consequently, PVRV was found safe and immunogenically efficacious during pregnancy.

7) **M K Sudarshan, S N Madhusudana, B J Mahendra, D H Ashwath Narayana, M Jayakumary, Gangaboraiah (1999): Post-exposure Rabies Prophylaxis with Purified Verocell Rabies Vaccine A Study of Immune Response in Pregnant Women and their Matched Controls, Indian Journal of Public Health, Vol. 43(2), 76-78.**

The present controlled clinical trial evaluates the immune response to purified Verocell Rabies Vaccine (PVRV) by Essen schedule of vaccination during pregnancy. Seventeen pregnant women with history of animal bites who received PVRV as per Essen regimen were matched for the confounding variables of age, socio-economic status and doses of PVRV received with seventeen "Non – pregnant women ". The mean age was about 24 years, majority (70.6%) belonging to middle socio-economic group and received 3 doses of PVRV. Contrary to the expectation the rabies neutralizing antibody titers were slightly higher in pregnant women (except day 180) but the differences was not significant ($p > 0.2$). Both the groups of women had antibody titers above protective level (0.5 IU/ml) from day 14 till day 365 thus indicating immunogenic efficacy of PVRV by Essen regimen during pregnancy.

8) **M K Sudarshan, B J Mahendra, D H Ashwath Narayana, Gangaboraiah (2000): Clinical Trials on Newer Anti-rabies Vaccines: Results and Some Experiences, Journal of APCRI, Vol. I, No.2, 21-25.**

Presently three types of cell culture vaccines are available in India which has proven record of safety and immunogenicity. As these vaccines are still gaining acceptance for routine use in India , search for more economical alternatives should continue .Over the past few years, this department has not only conducted clinical trials on well established vaccines such as purified verocell rabies vaccine (PVRV) which is already available in the Indian market but also on other newer cell culture vaccines like purified chick embryo cell vaccine, Kaketsuken (PCEC-K) and Rhesus diploid cell rabies vaccine (RDRV).All the vaccines induced protective titers of antibodies in 100% subjects by day14 . Minor side effects were observed with all three vaccines with good tolerance. The PVRV vaccine was found to be safe and immunogenic in pregnant women. Some of the experiences, pleasant and unpleasant obtained during the courses of the clinical trials is being shared with our colleagues.

9) **B J Mahendra, Sujitkumar, Kiran S Rao, M K Sudarshan, Gangaboraiah (2000): Clinico-epidemiological study of human rabies cases at Epidemic Disease Hospital, Bangalore. Journal of APCRI. Vol 1, issue 2, 43-45.**

A prospective study on the epidemiological factors persisting for the continued endemicity of human rabies in the city of Bangalore was carried out during one year period. Analysis of various causative factors reveled that fundamental aspects of post exposure treatment procedure were not followed in more than 80 % cases. Ignorance, poverty and lack of proper medical advice were the main reasons for inadequate management. Non-availability of anti rabies serum was another major factor. It is once again emphasized that unless rabies is considered a priority and adequate measures to curb this menace are taken, the disease will continue to occur despite the availability of preventive vaccines.

10) **M K Sudarshan, B J Mahendra, D H Ashwath Narayana (2001): A Community Survey of Dog Bites, Anti-Rabies Treatment, Rabies and**

Dog Population Management in Bangalore City, Journal of Communicable Diseases, Vol. 33(4), 245-251.

This survey was conducted by using a 30 cluster random sampling technique to comprehensively study the nature and magnitude of rabies and its related problems in human and dog population. The city has an estimated dog population of 3.25 lakhs of which 2 lakhs (61.5%) are stray dogs and 1.25 lakhs (38.5%) are pet dogs. The dog: man ratio was about 1:12 and the pet: stray dog ratio of 1:2 .The awareness about Animal Birth Control (ABC) programme was low (34%) and only 20% had faith in it. The annual incidence of dog bites was 1.9% persons. It was more in males (64%) and mostly from stray dogs (64%). About 86% of them received anti-rabies vaccination and none received life saving Anti rabies serum (ARS) .The annual incidence of human rabies was 15 and dog rabies 58 resulting in a ratio of 1:4 approximately as a rabies contagion index. The implementation of ABC programme was weak (10.4% coverage) and is recommended for acceleration and improvement. Similarly modern anti-rabies immunization, including anti-rabies serum, shall replace the outdated semple (sheep brain) vaccine.

11) **M K Sudarshan, B J Mahendra, D. H. Ashwath Narayana, K Rohith (2001): A Case Series Report of Successful Post-exposure Treatment of Proven Rabid Animal Bites: Journal of APCRI, Vol. II (Nos.1&2), 18-20.**

Nearly 50 % of people bitten by rabid animals develop rabies if effective post- exposure treatment is not administered. The treating physician's generally lack proper understanding and necessary confidence in providing this life saving treatment to animal bite victims, thus becoming responsible for many otherwise preventable deaths due to rabies. In this paper, seven recent successfully treated cases proven rabid animal bites are reported which should inform the appropriate method of post exposure treatment and instill confidence in treating physicians' in the country.

12) **M K Sudarshan (2001): A clinical algorithm of post exposure rabies prophylaxis for physicians in India. Journal of APCRI. Vol. 2 issue 1 &2, 15-16.**

Rabies prophylaxis is life saving in rabid animal bites and decision to

treat such cases is complex. A clinical algorithm of decision chart comprising of three steps viz. examination of wound(s), assessment of biting animal and advocating most appropriate treatment plan is presented to help treating physicians for making judicious decisions. It is hoped that this is suitability adopted by pharmaceutical industry and to popularize its use by physicians in their clinics /hospitals in India.

13) M K Sudarshan , B J Mahendra, S N Madhusudana, D H Ashwath Narayana (2002): Administration of Purified Verocell Rabies Vaccine during Pregnancy- Results of a Controlled Clinical Trial, Journal of Obstetrics and Gynecology of India Vol. 52 (2), 48-52.

In this prospective study 29 pregnant women and 17 non-pregnant women (paired and matched controls) received post-exposure rabies prophylaxis with Purified Verocell rabies Vaccine, PVRV (Verorab) by Essen regimen as approved by World Health Organization. The pregnant women group was regularly monitored throughout the pregnancy by Obstetricians, Ultrasonologists and Physicians and sero conversion was monitored throughout the pregnancy. In all, 106 doses of PVRV administered to pregnant women and 59 to the control group did not produce any adverse effects. The health of the pregnant women was normal throughout and they delivered babies who were healthy, free from any congenital defects and had normal growth and development during infancy as assessed by pediatrician. The vaccine was immunogenically efficacious in both the groups as all women had protective rabies neutralizing antibody titers ($\geq$0.5 IU/ml) from day 14 till day 365 of follow up. In conclusion, Purified Verocell rabies Vaccine (PVRV, Verorab) by Essen regimen is safe and efficacious in pregnant women.

14) M K Sudarshan, B J Mahendra, D H Ashwath Narayana (2002): A Cost-accounting Analysis of Production of Semple (Sheep brain) Vaccine in India, Journal of APCRI, Vol. IV, Nos. 1 & 2, 40-41.

A cost-accounting analysis of production of Semple (Sheep brain) vaccine at Vaccine Institute , Belgaum, Karnataka revealed that the cost of production of nerve tissue vaccine (NTV) was Rs. 5 per ml (excluding the capital cost of land) and it would cost Rs. 150/- or US $ 3.5 approximately to treat one patient (30 ml approx).In view of the recent

Supreme Court ruling , the WHO and the National Institute of Communicable Diseases (NICD) recommendations , the pressures from animal welfare groups and for an ethical treatment of animal bite victims, it is recommended to phase out the NTV by December 2003 and simultaneously phase in the intradermal rabies vaccination as a cost-effective alternative to NTV.

15) **M K Sudarshan, B J Mahendra, T V Sanjay, D H Ashwath Narayana (2003): Promoting Use of Rabies Immunoglobulin in India: A Public Health Challenge, Journal of APCRI, Vol. V, No 1 & 2, 8-10.**

It has been well proven beyond doubt that Rabies Immunoglobulins (RIGs) are life saving drugs in class III (severe exposure) rabid animal bites .But unfortunately a recent country wide survey indicates hardly about 2 % of bite victims receive RIGs and thus resulting in high human rabies mortality which otherwise is preventable. A critical appraisal of the current situation is discussed.

16) **Mahendra B J, Sanjay T V, Ashwath Narayana D H, Sudarshan M K (2003): Rabies Immunoglobulins in Post exposure Prophylaxis - Study of 236 Subjects: Journal of APCRI, Vol. V, Issue 1 & 2, 26-33.**

Rabies is a virtually 100% fatal diseases but is preventable if the post exposure prophylaxis is initiated in time and administered as per national guidelines including administration of rabies immunoglobulin (RIG). The use of RIGs is very limited mostly due to non-affordability/availability of human rabies immunoglobulin (HRIG) and fear of anaphylaxis with equine rabies immunoglobulin (ERIG). This study was undertaken in this background to provide information on the safety and efficacy of RIGs. The present study was conducted with the following objectives: to ascertain the socio-demographic characteristics of exposed subjects and related aspects of management of exposure, to assess the adverse reactions to RIGs and to assess the clinical efficacy in confirmed rabies exposure. This is a longitudinal, prospective, non-randomized interventional study involving 236 subjects. Most of the exposures 184 (78.0%) occurred during daytime, Dogs were the commonest biting animals 215 (91.1%) and these were mostly strays 125 (53.0%). Majority of the biting animals involved 150 (63.6%) were presumably rabid .All the exposures were WHO Class III.

Seven subjects were exposed to laboratory confirmed rabid animals. The average volume of ERIG required was 3.4 ml in children and 10.3 ml in adults. The volume was 2.5 ml in children and 7.8 ml in adults on an average for HRIG. 222(94.1%) subjects received ERIG, 25 (11.3%) of the subjects had a positive skin test and of these ERIG was not administered in 11 subjects. The average time required for ERIG administration was 63 minutes including test dose .Delayed reaction was reported by 8 (12.1%) of subjects. All 7 (100%) of the subjects exposed to laboratory confirmed rabid animals were alive and healthy at the end of 1 year from the date of exposure. It is evident from the present study that adult males and children are more commonly exposed to animal bites. Dogs mostly strays are the commonest biting animal and most of the biting animals are presumably rabid, awareness regarding wound toilet is poor and irritant application is still a concern and both types of RIGs are safe and efficacious in prevention of Rabies.

17) **S. N. Madhusudana, T V Sanjay, B J Mahendra, M S Suja, (2004): Simulated post exposure rabies vaccination with purified chick embryo cell vaccine using a modified Thai Red Cross regimen, International Journal of Infectious Diseases: Vol. 8, 175-179.**

Currently, two intradermal regimens for the administration of cell culture rabies vaccines are approved by the WHO for rabies post-exposure prophylaxis: the two sites Thai Red Cross regimen (TRC) and the eight site regimen. For the TRC regimen the volume of vaccine recommended per dose is 0.1 ml of purified Verocell rabies vaccine (PVRV) and 0.2 ml of purified chick embryo cell vaccine (PCEC). The objective of the present study was to evaluate comparatively the immune response to PCEC and PVRV vaccines administered by the TRC regimen using a uniform dose of 0.1 ml of vaccine. Methods: Forty-two subjects received TRC regimen (2-2-2-0-1-1) with 0.1 ml of PCEC vaccine and 38 subjects received the same regimen with PVRV. The rabies neutralizing antibody response in these subjects on days 10, 28, 90 and 180 was determined by the standard mouse neutralization test (MNT). Results: There was adequate antibody response with both the vaccines and 100% sero conversion was observed by day 10. Furthermore, the antibody, titers obtained with PCEC did not differ significantly from those obtained with PVRV on all days tested ($p > 0.05$). Conclusions: It can be concluded from the

results that an adequate antibody response can be obtained with PCEC vaccine when administered by the TRC regimen even after reducing the quantity of vaccine from 0.2ml to 0.1 ml per intradermal dose. The feasibility of using this regimen in true post-exposure cases needs to be further evaluated.

18) **M K Sudarshan (2004): Assessing Burden of Rabies in India: WHO sponsored national Multi centric Rabies Survey, 2003, Infectious Diseases Journal of Pakistan, Vol. 3, 66-67.**

19) **S. Abdul Rahman, M K Sudarshan, B J Mahendra, S N Madhusudana, D H Ashwath Narayana (2005): Assessing burden of rabies in India from a veterinary perspective: Results of a National Multi-centric Epidemiological survey. Journal of Commonwealth Veterinary Association.Vol.21.No.2 31-36.**

Though human rabies is endemic in India, a nationwide epidemiological study has never been done .A WHO sponsored survey was conducted jointly by the Association for Prevention and Control of Rabies in India (APCRI), Kempegowda Institute of Medical Sciences (KIMS) and the Commonwealth Veterinary Association (CVA) to assess the burden of rabies in India. While the results of the medical survey have been published elsewhere, this paper deals with the veterinary aspects of the survey. For animal rabies the data is very scarce. The dog population of India is estimated to be 25 million most of which are ownerless and are not immunized against rabies. Canine or other animal rabies is believed to be distributed widely in India. But an analysis of data on animal rabies (mostly clinically diagnosed) for the period 1991-2000 reveals that it was reported in only 128 of the 507 districts of the country and the number of districts reporting rabies cases was further reduced to 30 during 1998-2000 .There are large geographical areas of the country where animal rabies has not been reported during the last 10 years. Against this background, and in order to clarify the above situation of ignorance, conflict and confusion, APCRI, a registered scientific society with technical and financial assistance from World Health Organization and Commonwealth Veterinary Association undertook this multi-centric study.

20) M K Sudarshan, B J Mahendra, D H Ashwath Narayana (2005): Introducing intra-dermal rabies vaccination in India: Rationale and action plan. Journal of APCRI, Vol.VII, 1 & 2, 20-25.

Following the discontinuation of semple (or sheep brain/Nerve tissue) vaccine in December, 2004, the Government hospitals in the country are facing an acute shortage of modern rabies vaccines. This is due to limited budget and the modern rabies vaccines are expensive by intramuscular route. However, there is a dilemma to replace the semple vaccine by intradermal rabies vaccination (IDRV). There are also opinions in certain quarters that IDRV is inferior / substandard and the technique of ID administration is difficult to practice. In this context, this paper elaborates on the scope of IDRV in India.

21) M K Sudarshan, S N Madhusudana, B J Mahendra, D H Ashwath Narayana, M S Anandagiri, O. Popova, H B Vakil (2005): Evaluation of a new five-injection, two-site, intradermal schedule for purified chick embryo cell rabies vaccine: A randomized, open-label, active-controlled trial in healthy adult volunteers in India. Current Therapeutics Research.Vol.66, (4), 323-334.

Human rabies is an ongoing significant public health problem in many developing countries, with India reporting the highest incidence of rabies-related deaths (~20,000 per year). Many people living in India cannot afford the standard IM post exposure prophylaxis (PEP) with cell-culture vaccines, which are administered using a 5-dose regimen developed in Essen, Germany. A potentially less expensive intradermal (ID) regimen, based on the Essen regimen, has been developed at the Kempegowda Institute of Medical Sciences (KIMS), Bangalore, India. Objective: The objective of this study was to compare the immunogenicity and local and systemic tolerability of the KIMS-ID regimen with those of the standard Essen IM regimen in healthy adult volunteers in India. Methods: This randomized, open-label, active-controlled trial was conducted at the Anti rabies clinic, Medical College, KIMS. Healthy adult volunteers were randomly assigned to receive purified chick embryo cell vaccine (PCECV) using the KIMS-ID regimen (0.1 mL injected ID at 2 body sites on days 0, 3, 7, 14, and 28 ["2-2-2-2-2"]) or the Essen IM regimen (1 mL injected IM at 1 body site on the

same days (1-1-1-1-1). Subjects were followed up for 365 days by the treating physician and encouraged to voluntarily report any adverse events (AEs). Serum rabies virus-neutralizing antibody (RVNA) concentrations were measured before the first injection on day 0 (baseline) and on days 14, 28, 90, 180, and 365, using the rapid fluorescent focus inhibition test. Results: Ninety-one subjects were enrolled and included in the tolerability and immunogenicity analyses. The ID group comprised 45 subjects (26 men, 19 women; mean [SD] age, 20.84 [1.48] years); the IM group, 46 subjects (28 men, 18 women; mean [SD] age, 21.02 [1.16] years). The most common local AEs were pain at the injection site 2/225 [0.9%] in the ID group and 10/230 [4.3%] in the IM group; $P < 0.006$ and itching at the injection site (5/225 [2.2%] in the ID group and none in the IM group; $P = 0.026$). All of the AEs were transient and resolved without the need for medication. All subjects had serum RVNA concentrations ≥ 0.5 IU/mL considered protective by the World Health Organization at all follow-up visits. However, the mean RVNA concentrations in the IM group were significantly higher compared with those in the ID group from days 14 to 365 (all, $P < 0.001$).Conclusion: In this study in healthy volunteers, PEP with PCECV administered using the KIMS-ID regimen was well tolerated and immunologically efficacious for 365 days. Adequate RVNA levels were maintained with the KIMS-ID regimen from days 14 to 365, although these levels were significantly lower than those achieved in the group receiving the Essen IM regimen (all, $P < 0.001$).

22) M. K. Sudarshan, B J Mahendra, S N Madhusudana, D H Ashwath Narayana, T V Sanjay, Gangaboraiah, M S Anandagiri (2005): Assessing the relationship between antigenicity and immunogenicity of human rabies vaccines: Results of a Meta Analysis. Human Vaccines Vol. 1:5, 187-190.

A meta-analysis was done to study the relationship between antigenicity and Immunogenicity of human rabies vaccines. The data of ten cell culture human rabies vaccine studies conducted at a single centre during 1993-2004 were used in the study .The vaccines studied included Purified Chick Embryo Cell Vaccine (Kaketsuken, Japan and Rabipur, India). Purified Vero cell Rabies Vaccine (Verorab, France), Human Diploid Cell Vaccine(MIRV, France and Rabivax, Adsorbed and

Lyophilized, India) and Rhesus Diploid Rabies Vaccine (adsorbed, USA).Interestingly , it was revealed that an higher antigenicity of rabies vaccines viz potency of $\geq$ 5 IU per single intramuscular dose did not result in significantly higher immunogenicity , as measured by rabies virus neutralizing antibody (RVNA) titers in the vaccinees, both on day 14 ($t=0.42, p>0.66$, GMR $=1.06$, 95%CI of GMR $=0.82, 1.37$) and day 90($t=0.80$, $p>0.43$,GMR $=1.15$, 95%CI of GMR $=0.74,1.14$). However, as there are no reports of meta-analysis of cell culture human rabies vaccine trials, to confirm this observation the authors recommend further studies in this regard.

23) M.K. Sudarshan, B J Mahendra, S N Madhusudana, S Abdul Rahman, D H Ashwath Narayana, (2006): An Assessment of Rabies Free Status of the Island of Andaman, Nicobar and Lakshadweep: Results of The WHO Sponsored National Multi centric Rabies Survey. Indian Journal of Public Health Vol. XXXXX No.1, 11-14.

The Islands of Andaman and Nicobar and Lakshadweep have been reported to be rabies free from time immemorial. Recently, a survey of the islands of Andaman and Nicobar & Lakshadweep was done between July and August 2003 to assess their rabies free status. It was revealed that these islands continue to remain rabies free. However, in Andaman's the increasing dog population, poor vigil on import of dogs and lack of laboratory surveillance for rabies posed a threat to this status. The Lakshadweep islands, which are free of dogs, however, faced a threat from lack of vigil on the entry and presence of cats and poor surveillance for rabies in them.

24) M. K. Sudarshan, B J Mahendra, S N Madhusudana, D H Ashwath Narayana, S Abdul Rahman, N S N Rao, F X Meslin, Derek Lobo, K Ravikumar, Gangaboraiah (2006): An Epidemiological Study of Animal bites in India: Results of a WHO sponsored National Multi centric Rabies Survey. Journal of Communicable Diseases Vol.38 (1), 32-39.

This was a WHO sponsored national multi-centric rabies survey and one of its objectives was to find out the incidence of animal bites, anti-rabies treatment practices, Pet dog population and their care. Twenty-one medical colleges chosen with geo scatter representation conducted the survey during February-August, 2003. The survey was conducted in 18

states, covering a population of 52,731 chosen randomly from 8500 households. The annual incidence of animal bites was high, 1.7% and it was more in rural areas (1.8%), children (2.6%) and poor/low income group (75%). The main biting animal was dog (91.5%), mostly stray (63%), followed by cat (4.7%). A high proportion of bite victims did not wash their wounds with soap and water (39.5%), preferred Government hospitals (59.9%) and nerve tissue vaccine (46.9%). The use of rabies immunoglobulin was low (2.1%). A single animal bite episode led to a loss of 2.2 man-days and the cost of medicines including anti-rabies vaccine was Rs.252 (US$6). The recourse to indigenous treatment (45.3%) and local application to wound (36.8%) was quite prevalent. About 17% of households reported having a pet/domesticated dog and the pet dog: man ratio was 1: 36. Pet dog care/management practices were not satisfactory with a low veterinary consultation. (35.5 %) and vaccination (32.9 %). The situation was slightly better in urban areas. The people also reported the presence (83 %) and menace (22.8 %) of stray dogs. It is recommended to initiate appropriate community awareness and dog vaccination campaigns and effective stray dog control measures.

25) M K Sudarshan, S N Madhusudana, B J Mahendra, D H Ashwath Narayana, M S Anandagiri, K Muhamuda, H S Ravish, G M Venkatesh (2006): Boosting Effect of purified chick embryo cell rabies vaccine using the intradermal route in persons previously immunized by the intramuscular route or vice versa. National Medical Journal of India, July-August, 19, 4,192-194.

At present, in the event of re-exposure to rabies, 2 booster doses are recommended for people who have been previously vaccinated with cell culture rabies vaccines by the convention intramuscular route. As the intradermal route of vaccination is likely to be introduced in the future, we investigated the immune response to a cell culture rabies vaccine after crossing over from the intramuscular to the intradermal route and vice versa. Methods: Twenty healthy adult volunteers who had received a primary course of rabies vaccination with purified chick embryo cell rabies vaccine by either the intramuscular (n=10) or intradermal (n=10) route received booster vaccination with the same vaccine by the alternative route. The regimen used was 0.1 ml of vaccine by the intradermal route at two sites (deltoid area) for the intramuscular group,

or1 ml of vaccine by the intramuscular route (deltoid muscle) to the intradermal group on days 0 and 3. Results: There was a 15-fold rise in the rabies virus neutralizing antibody response both by the intradermal and intramuscular routes of booster vaccination ($p < 0.0001$). Thus, the change of route of purified chick embryo cell booster vaccination did not alter the anamnestic immune response to the vaccine. No side-effects were observed after vaccination with either of the routes. Conclusion: Purified chick embryo cell vaccine was found to be safe and immunologically efficacious following booster vaccination after cross-over from the intradermal to the intramuscular route and vice versa.

26) M K Sudarshan, B J Mahendra, D. H. Ashwath Narayana, T V Sanjay, M S Anandagiri, G M Venkatesh (2006): Evaluation of safety and efficacy of a new indigenous equine rabies immunoglobulin, Journal of APCRI, VIII, (1), 13-16.

Two hundred and seventy six patients with severe (WHO category III) exposure to rabies were treated with equine rabies immunoglobulin (ERIG) manufactured by Bharat Serums and Vaccines Limited, Mumbai. Seventeen (6.1%) patients showed a positive reaction to skin test dose. None of the patients had any immediate adverse effects. Assessment of delayed adverse effects was possible in seventy five patients. Out of these 75 patients, one(1.3%) patient had fever & pain at injection site and another(1.3%) complained of itching at ERIG infiltration site. Eight (2.9%) patients who were exposed to confirmed rabid animals were followed up for a period of 9 months and all (100%) were healthy and alive. In conclusion, Equirab was found to be safe and efficacious ERIG. The authors recommend its use in all WHO category III exposure to rabies.

27) S N Madhusudana, TV Sanjay, BJ Mahendra, M. K. Sudarshan, D H Ashwath Narayana, M S Anandagiri, K Muhamuda, V Ravi, H B Vakil, Cladius Malerczyk (2006): Comparison of safety and immunogenicity of Purified Chick Embryo Cell rabies Vaccine and Purified Verocell Rabies Vaccine using the Thai Red Cross Intradermal regimen at a dose of 0.1 mL. Human Vaccines. 2:5, 200-204.

Intradermal (ID) vaccination with modern cell culture rabies vaccines is

a means to significantly reduce the cost of post-exposure prophylaxis as compared to intramuscular vaccination. In this study we evaluated the efficacy, immunogenicity and tolerability of PCECV and PVRV administered ID in doses of 0.1 mL per site according to the 2-site Thai Red Cross (TRC) regimen. Patients with WHO category III exposure to suspect or laboratory proven rabid animals were administered either PCECV (n=58) or PVRV (n=52) ID at a dose of 0.1 mL per site at 2 sites on days 0, 3 and 7 and at one site on days 30 and 90. Serum samples were withdrawn on days 0, 14, 30, 90, and 180 and rabies virus neutralizing antibody (RVNA) titers were determined by rapid fluorescent focus inhibition test (RFFIT). Patients who were exposed to laboratory confirmed rabid animals were followed up for one year after exposure. All 110 patients developed RVNA titers above 0.5 IU/mL by day 14. Adequate titers >0.5 IU/mL were maintained up to day 180. Both vaccines induced equivalent RVNA titers at all time points and were well tolerated. Five subjects who were bitten by laboratory confirmed rabid dogs were alive and healthy one year after exposure. As demonstrated, PCECV and PVRV are both immunogenic, efficacious and well tolerated when administered in the TRC post-exposure prophylaxis regimen in ID doses of 0.1 mL as recommended by WHO guidelines. The use of PCECV in this regimen may prove more economical in developing countries like India.

28) M. K. Sudarshan (2006): Introducing intradermal rabies vaccination in India – Paradigm shift for the better. Indian Journal of Public Health, XXXXX, 4, 209-212.

29) M. K. Sudarshan (2006): Administration of rabies Immunoglobulins (RIGs): Allaying fears and instilling confidence. Infectious Diseases Journal of Pakistan. Vol.5. No.1 PP 9-12.

30) M. K. Sudarshan S N Madhusudana, B J Mahendra, D H Ashwath Narayana (2007): Intradermal rabies vaccination (IDRV) in Sri Lanka: Report of a study visit, Journal of APCRI, Vol.8, No.2, 9-10.

A team of medical doctors from the Rabies in Asia (RIA) Foundation (Registered) consisting of Professor M. K. Sudarshan (President) , Professor S. N. Madhusudana (Director), B. J. Mahendra (Executive Director), D.H. Ashwath Narayana (Treasurer) and Chhavi Sandhu,

Sanofi Aventis, Mumbai visited Sri Lanka from June 21-25, 2006 and held discussions with Drs. Athula Kahandaliyanage, Director General of Health Services (DGHS), Omala Wimalaratne and Kanthi, Medical Research Institute , PAL Harischandra , Director , Veterinary Public Health, Amila Gunasekara, National Hospital of Sri Lanka, (NHSL), Colombo. The team visited the IDRV clinics of NHSL, South Colombo and Children's hospital.

31) B. J. Mahendra, M. K. Sudarshan, D H Ashwath Narayana, G Sampath (2007): A study of rabies prevention and control in the Philippines, Journal of APCRI, Vol.8,No. 2, 11-13.

Rabies continues to be disease of public health importance in India .The rabies prevention activities in India are on the verge of a paradigm shift, with the cessation of the production of the sheep brain vaccine (NTV).The cost of providing the modern vaccine intramuscularly is expensive. Following the success of the intradermal rabies vaccination [IDRV] program in Thailand, Philippines and Sri Lanka, and on the recommendations of WHO, the Government of India in February 2006 permitted the use of intradermal rabies vaccination [IDRV] in the country. In this background , a team of Doctors led by Dr. M. K. Sudarshan visited and had detailed discussion with the officials involved in rabies prevention and control programmes from the Department of Health , Research Institute for Tropical Medicine [RITM], Municipalities , Veterinary services and Animal Bite Treatment Centers [ABTCs] both in the government and the private setups. The team also studied the implementation of IDRV in the Philippines .The other aspects of RIG use and reservoir control were also studied.

32) M. K. Sudarshan, M S Anandagiri, B J Mahendra, G M Venkatesh, T V Sanjay, D H Ashwath Narayana, H S Ravish (2007): Assessing the safety of post-exposure rabies immunization in pregnancy, Human Vaccines, Vol.3:3, 87-89.

Fourteen pregnant women who received rabies post-exposure prophylaxis (PEP) at the anti-rabies clinic (ARC) of Kempegowda Institute of Medical Sciences (KIMS) were followed up for assessing the safety of modern rabies vaccines and equine rabies immunoglobulin (ERIG) in pregnancy .The women were in the age range of 18-28 years ,

mostly from urban area (64%) and exposed to suspect rabid dogs (86%).They had received purified verocell rabies vaccine (Verorab=8 and Abhayrab=4), purified chick embryo cell vaccine (Rabipur =2) by Essen regimen; and equine rabies immunoglobulin (Equirab =7 and Pasteur anti-rabies serum=1).None of the pregnant women reported any adverse events to either vaccine or equine rabies immunoglobulin. All had safe vaginal deliveries and in all cases both the mother and the child were found to be healthy and normal.

33) M. K. Sudarshan, S N Madhusudana, B J Mahendra, NSN Rao, D H Ashwath Narayana, S Abdul Rahman, F X Meslin, D Lobo, K Ravikumar, Gangaboraiah (2007): Assessing burden of human rabies in India: Results of a National Multicenter epidemiological survey, International Journal of Infectious Diseases, Vol.11, Issue 1, 29-35.

Human rabies has been endemic in India since time immemorial and the true incidence of the disease and nationwide epidemiological factors have never been studied. The main objectives of the present study were to estimate the annual incidence of human rabies in India based on a community survey and to describe its salient epidemiological features. Methods: The Association for prevention and control of rabies in India (APCRI) conducted a national multi-center survey with the help of 21 medical schools during the period February- August 2003. This community- based survey covered a representative population of 10.8 million in mainland India. Hospital- based data were also obtained from the 22 infectious diseases hospitals. A separate survey of the islands of Andaman, Nicobar, and Lakshadweep, reported to be free from rabies, was also undertaken. Results: The annual incidence of human rabies was estimated to be 17 137 (95% CI 14 109- 20 165). Based on expert group advice, an additional 20% was added to this to include paralytic/atypical forms of rabies, providing an estimate of 20 565 or about 2 per 100 000 population. The majority of the victims were male, adult, from rural areas, and unvaccinated. The main animals responsible for bites were dogs (96.2%), most of which were strays. The most common bite sites were the extremities. The disease incubation period ranged from two weeks to six months. Hydrophobia was the predominant clinical feature. Many of the victims had resorted to indigenous forms of treatment following animal bite, and only about half

of them had sought hospital attention. Approximately 10% of these patients had taken a partial course of either Semple or a cell culture vaccine. The islands of Andaman, Nicobar, and Lakshadweep were found to be free of rabies. Conclusion: Human rabies continues to be endemic in India except for the islands of Andaman, Nicobar, and Lakshadweep. Dogs continue to be the principal reservoir. The disease is taking its toll on adult men and children, the majority from rural areas, due to lack of awareness about proper post-exposure immunization. The keys to success in the further reduction of rabies in India lies in improved coverage with modern rabies vaccines, canine rabies control, and intensifying public education about the disease.

34) M. K. Sudarshan, B J Mahendra, H S Ravish, D H Ashwath Narayana, T V Sanjay, M S Anandagiri, G M Venkatesh (2007): Assessing the clinical efficacy of post-exposure prophylaxis following confirmed rabies exposures, Journal of APCRI, Vol.9,No1, 13-15.

One hundred and eighteen patients, who were exposed to rabies, received post exposure prophylaxis at the Anti-Rabies Clinic of KIMS Hospital, Bangalore. Majority were adults (84.8%), males (63.5%) from urban area (74.6%) and belonged to middle socio-economic group (75.4%).The dog (67.8%) was the main biting animal and majority (72%) had WHO category III exposure .The confirmation of rabies in the biting animal was done by examination of brain for Negri bodies using seller's stain and in doubtful cases by fluorescent antibody test. In those exposed to human rabies cases, the diagnosis was made on clinico-epidemiological basis .The first aid was done by 55% of victims before they reached the ARC. All were successfully treated with modern rabies vaccines viz. PCECV (57.6%), PVRV (29.6%), HDCV (6.9%) and PDEV (5.9%).Those having category III exposure additionally received RIG viz. Human RIG (8.2%) and Equine RIG (91.8%).The rabies PEP was found to be highly efficacious and life saving.

35) M K Sudarshan, N S Kodandaram, G M Venkatesh, B. J. Mahendra, D. H. Ashwath Narayana, B G Parasuramalu (2007): Evaluation of a new premedication protocol for administration of equine rabies immunoglobulin in patients with hypersensitivity. Indian Journal of Public Health, Vol.51, No.2, 91-96.

The present study was undertaken to standardize skin testing and to

develop a safe and effective premedication protocol for administration of ERIG in those with skin test positivity/hypersensitivity. Methods: A method of grading of skin testing was developed using injection histamine as a positive control. This was evaluated by using it on 517 subjects who had severe (WHO category III) exposure to rabies. A premedication protocol consisting of Injection Phenaramine, Injection Ranitidine, Injection Hydrocortisone and Injection Adrenaline was evaluted by using it on fifty one subjects who were skin test positive /hypersensitive to ERIG. Results: The premedication protocol was safe and effective as all the 51 subjects could be administered the full dose of ERIG despite being skin test positive /hypersensitive to ERIG. Besides the premedication drugs/ protocol did not affect the immune response to vaccine and ERIG therapy.

36) **B J Mahendra, S N Madhusudana, D H Ashwath Narayana, G Sampath, S S Dutta, M K Sudarshan, G M Venkatesh, K Muhamuda, Gangaboraiah, S Manjula (2007): A comparative study on the immunogenicity, safety and tolerance of purified duck embryo vaccine (PDEV) manufactured in India (Vaxirab) and Switzerland (Lyssavac-N): A randomized simulated post exposure study in healthy volunteers. Vaccine, 25, 8405-8409.**

Purified duck embryo vaccine (PDEV, Vaxirab) for rabies prophylaxis is now indigenously manufactured in India under technology transfer from Berna Biotech who made the original PDEV (Lyssavac). In the present study we have compared the two vaccines in terms of safety, immunogenicity and tolerance. The study was conducted in 220 adult healthy volunteers. It was observed that both vaccines produces neutralizing antibody titers (as determined by rapid fluorescent focus inhibition test, RFFIT) more than 0.5 IU/mL (minimum level for sero conversion) on all days tested but the titers on days 90 and 180 were significantly higher with Lyssavac. The adverse reactions produced were slightly more with Lyssavac but both vaccines were well tolerated. In conclusion, the indigenously produced PDEV (Vaxirab) was found to be equally safe and immunogenic as the original PDEV (Lyssavac) manufactured at Switzerland.

37) **M. K. Sudarshan (2007): The changing scenario of rabies in India: Are we moving towards its prevention and control? Indian Journal of Public Health. Vol.51 No.3,145-147.**

38) M. K. Sudarshan, S Yathiraj, D H Ashwath Narayana, Gangaboraiah, S N Madhusudana, (2008): A performance audit of animal birth control (ABC) programme in Bangalore city, India. Journal of CVA, July, 10-13.

A performance audit of an Animal birth Control (ABC) programme was conducted in Bangalore city, India and information was collected on predesigned proforma from Animal Welfare Organizations, the Bangalore City Municipal Corporation, the Veterinary college and Hospital, the Epidemic Diseases Hospital and the Community Opinion survey. It was found that there was no pre capture survey done and the methods of identification of dogs and the recording of data were faulty. About 63% of dogs examined at the Veterinary College were positive for rabies and 492 cases of human rabies were reported from Epidemic Diseases Hospital in the last decade. The majority (64%) of the respondents from the community didn't want an ABC programme and 72% resented the presence of stray dogs in their neighborhood. Only 38% of dogs vaccinated under the ABC programme had adequate anti rabies antibodies, signifying poor efficacy of vaccination. The continuous shortage of anti rabies vaccines and scare use of rabies immunoglobulin's to treat dog bite victims were of public health concern.

39) M. K. Sudarshan, S Bhardwaj, B J Mahendra, H Sharma, T.V. Sanjay, D H Ashwath Narayana, Gangaboraiah (2008): An immunogenicity, safety and post marketing surveillance of a novel absorbed human diploid cell rabies vaccine (Rabivax®) in Indian subjects. Human vaccines, 4:4, 275-279.

In 1999, Serum Institute of India indigenously developed an adsorbed human diploid cell rabies vaccine (Rabivax). During 2000 – 04, this new vaccine was subjected to a series of immunogenicity and safety studies. Initially, an experimental batch of Rabivax (adsorbed) was assessed on 10 healthy adult volunteers and its response was comparable with that of Merieux inactivated rabies vaccine (MIRV, lyophilized) which was used as a control. Subsequently, Rabivax (adsorbed) was assessed on forty-five suspect rabid dog bite cases with MIRV as control. The vaccine was found to be equally safe and immunogenic as MIRV and showed better rabies virus neutralizing antibody (RVNA) response on day 90 than MIRV. A post-licensing study

conducted on 150 cases of suspect rabid animal bites showed it to be safe and immunogenic. To assess its long-term sero-efficacy some of these subjects tested after one year of follow up showed that 84% of them had adequate RVNA titers. In addition, a routine post-marketing surveillance done on 1608 animal bite cases demonstrated that Rabivax (adsorbed) was safe and efficacious. The adverse events to Rabivax (adsorbed) included pain at injection site (3.4%), swelling with induration (2.8%), fever and headache (1.4%). No serious adverse event was reported from the studies. In conclusion, Rabivax (adsorbed) is an immunogenic, safe, and efficacious vaccine for rabies prophylaxis in humans.

40) M K Sudarshan, Subodh Bhardwaj, V. Shandilya (2009): The future of rabies post-exposure prophylaxis: Development of human monoclonal antibody combination. Journal of APCRI, Vol 11, issue 1: 29-32.

The current management for individuals exposed to rabies virus involves the combined administration of rabies vaccines and rabies immunoglobulin (RIG). However, the severely limited supply of RIG hampers its availability. To circumvent the global RIG shortage, virus-specific monoclonal antibodies (mAbs) against rabies are being developed. This review follows the development of human mAbs, to replace the RIG of serum plasma origin. The authors review the RIG usage and its limitations and follow the pre- clinical and clinical development of mAbs as a future option for effective management of patients at the risk of rabies infection.

41) M. K. Sudarshan et al (2009): The future of rabies post-exposure prophylaxis: Development of human monoclonal antibody combination, Infectious Diseases Journal of Pakistan, Vol. 18, No.3, 86-88.

42) D. H. Ashwath Narayana, S N Madhusudhana, G Sampath, D M Satapathy, Ranjit Mankeshwar, H S Ravish, P T Ullas, T R Behra, M K Sudarshan, Gangaboraiah, S Manjula (2010): A comparative study on the safety and immunogenicity of purified duck embryo cell vaccine (PDEV, Vaxirab) with purified chick embryo cell vaccine (PCEC, Rabipur) and purified verocell rabies vaccine (PVRV, Verorab), Vaccine, 28, 148-151.

Rabies is a fatal but preventable disease. Cell culture vaccines (CCV) and

purified duck embryo vaccines (PDEV) are currently recommended by WHO for post-exposure prophylaxis. In India, a PDEV (Vaxirab) is being manufactured and is in use since 2003. In the present study, we have evaluated the safety, immunogenicity and tolerance of this vaccine with two other WHO approved CCVs, viz., purified chick embryo cell vaccine (PCEC, Rabipur) and purified verocell rabies vaccine (PVRV, Verorab). This study was an open label, randomized, phase IV comparative clinical trial. A total of 152 people bitten by dogs and other animals were recruited from 4 different centers from India. There were randomly assigned to receive one of the vaccines by Essen intramuscular regimen (52 subjects received Vaxirab and 50 each received Rabipur and Verorab) and rabies immunoglobulin was also administered in all category III exposures. Their blood samples were collected on day 0 (prior to vaccination), 14, 28, 90 and 180. Side effects if any were monitored. The rabies neutralizing antibody titers in their blood samples were estimated by the rapid fluorescent focus inhibition test (RFFIT). Subjects in all three groups had neutralizing antibody titers by day 14 ($>$0.5 IU/ml) and geometric means titers (GMT) observed for different vaccines on all days tested did not vary significantly ($p>0.5$). Side effects observed were minimal and did not vary significantly among the groups. The results of the present study indicate that PDEV (Vaxirab) is as safe, tolerable and immunogenic as both PCEC (Rabipur) and PVRV (Verorab). Thus this vaccine can be a good alternative to WHO approved CCVs for rabies post-exposure prophylaxis.

43) M K Sudarshan, D H Ashwath Narayana (2010): A clinical evaluation of usage of rabies Immunoglobulin, Journal of APCRI, Vol. XI, Issue 2, 33-34.

World Health Organization (WHO) recommends infiltration of rabies immunoglobulins into animal bite wounds as a life saving measure in all severe or category III exposures. In case of animal bite victims with less number of wounds, after infiltration of all wounds, any remaining RIGs, is administered intramuscularly or systemically at a site away from site of vaccine administration as per the recommendation of WHO. Hence, this study was done to identify the ratio of volume of RIGs injected into or around the wound (s) and intramuscular (IM) or systemic at a site distant from the site of vaccine administration. Methods: A case record analysis of persons treated following exposure to rabies during June, 2008 to August 2009 in anti-rabies clinic of KIMS Hospital, Bangalore revealed that out of 1270 cases treated with rabies immunoglobulins,

31(2.4%) patients had severe /WHO category III confirmed rabid exposures. Results: Majority were males (81%), aged 3 to 60 years and the body weight ranged from 13 to 81 kgs. The biting animal was mostly dog (74.2%) and wounds were abrasions & lacerations (35%) and on lower limbs (45%). Equine RIGs (87%) was injected in undiluted form and the wastage factor/ ratio i.e. volume of RIGs (in ml) injected into and around wound(s) to volume injected IM/systemic was about 1:0.8. Conclusion: In more than 87% of subjects, RIGs in an undiluted form was injected systemically in those who have fewer animal bite wounds and usage to wastage factor was calculated to be 1:0.8. The study recommends evaluation of the benefit or otherwise of systemic/ IM injection of RIGs.

44) D H Ashwath Narayana, Ksh Manglem Singh, B J Mahendra, M K Sudarshan (2010)- Investigation of an outbreak of human rabies in Manipur, Journal of APCRI, Vol. XII, Issue 1,30-32.

An outbreak of human rabies in Manipur was investigated during April – May 2006. Manipur is a hilly state in the North East of India having 09 District with a population of 23, 88,634. The current outbreak of human rabies affected the 4 districts viz Imphal East, Imphal West, Thoubal & Bishnupur situated in the valley. 28(96.5%) of human rabies deaths occured from these 4 districts during January to May 2006. The majority of cases were admitted to RIMS Hospital, Imphal. 28(96.5%) cases occurred following dog bites and none had received complete post exposure prophylaxis. Large number of unvaccinated canine population, not providing post exposure prophylaxis & lack of awareness about rabies prevention among general public were responsible for this outbreak. Following this outbreak, Government of Manipur initiated mass vaccination of dogs in all the districts and supplied human rabies vaccines to government hospitals across the state. To prevent rabies outbreak in future, there is a need to create awareness on rabies prevention among people and professionals, supplying sufficient quantities of modern rabies vaccines & RIG to all the government hospitals and establishing rabies diagnostic laboratory. Adopting dog population control measures with regular mass vaccination of dogs would go a long way in prevention and control of rabies both in man and dogs.

45) **M K Sudarshan, Gangaboraiah, H S Ravish, D H Ashwath Narayana (2010): Assessing the relationship between antigenicity and immunogenicity of human rabies vaccines when administered by intradermal route: Results of a metaanalysis. Human Vaccines, Vol. 6, issue 7, 562-565.**

The metadata of 10 published studies and 3 vaccine trial reports comprising of 19 vaccine cohorts from four countries conducted over a period of 23 years (1986–2009) was used for meta-analysis. The vaccines studied were purified chick embryo cell vaccine (Rabipur, India and Germany), purified verocell rabies vaccine (Verorab, France; Indirab, India) and human diploid cell vaccine (MIRV, France). The potency of these vaccines varied from 0.55 IU to 2.32 IU per intradermal dose of 0.1 ml per site. The vaccines were administered to 1,011 subjects comprising of 19 cohorts and using five different ID regimens. The immunogenicity was measured by assays of rabies virus neutralizing antibody (RVNA) titers using rapid fluorescent focus inhibition test (RFFIT) [15 cohorts] and mouse neutralization test (MNT) [4 cohorts]. The statistical analysis of the data was done by Karl Pearson's correlation coefficient to measure the relationship between antigenicity and immunogenicity. It was revealed that, there was no significant linear relationship between antigenicity and immunogenicity of rabies vaccines when administered by intradermal route ($p > 0.230$ and $p > 0.568$).

46) **B J Mahendra, S N Madhusudana, G Sampath, S S Dutta, D H Ashwath Narayana, G M Venkatesh, M K Sudarshan, Gangaboraiah, S Manjula (2010): Immunogenicity, safety and tolerance of a purified duck embryo vaccine (PDEV, Vaxirab) for rabies post exposure prophylaxis-Results of a multi centric study in India. Human Vaccines, 6:9, 1-4.**

Rabies continues to be a Major public health problem in India. Nearly 17 million people are getting exposed to this disease every year. Therefore the need for effective post exposure prophylaxis with safe and potent modern rabies vaccines continues to exist. Purified duck embryo vaccine (PDEV) was introduced in this country to meet the ever increasing need for modern rabies vaccines. In this study we have assessed the safety, immunogenicity and tolerance of an indigenously manufactured PDEV in people exposed to dog and other animal bites.

One hundred and fifty people (5-59 years) who were having WHO category II or III animal bites were vaccinated with PDEV using the Essen intramuscular regimen and the rabies immunoglobulin(RIG) was administered to category III exposures. Their blood samples were analyzed for rabies virus neutralizing antibody response (RVNA) by Rapid Fluorescent Focus Inhibition Test (RFFIT) on day 0,14,30,90,180 and 365. Adverse effects to vaccines were monitored during the course of vaccination. There was 100% ser-conversion from day 14 onwards with adequate RVNA titers ($\geq$0.5 IU/mL) up to day 365. The incidence of side effects was minimal and self limiting. Hence it can be concluded that indigenously manufactured PDEV (Vaxirab) is a safe and immunogenic vaccine and can be safely be used for post-exposure prophylaxis.

47) G Sampath, S N Madhusudana, M K Sudarshan, D H Ashwath Narayana, B J Mahendra, T P Ullas, Krishna Mohan, Santosh Kumar, H S Ravish (2010): Immunogenicity and safety study of Indirab: A verocell based chromatographically purified human rabies vaccine, Vaccine, 28, 4086-4090.

A chromatographically purified Vero cell rabies vaccine, Indirab manufactured by Bharat Biotech International Limited, Hyderabad, India was subjected to safety and immunogenicity studies by both intramuscular and intradermal routes of administration in parallel with a reference vaccine, Verorab. A pre-exposure study was undertaken in 239 subjects by intramuscular (IM) route (study I), post exposure study in 188 patients by intramuscular route (study II) and simulated post-exposure study in 134 subjects by intradermal (ID) route (Study III). All subjects in these studies were administered with either the test or the reference vaccine as per WHO approved intramuscular and intradermal regimens. The blood samples were collected on day 0, 14 and 35 in case of study 1, and day 0,14,28 and 90 in cases of studies II and III. In all studies both vaccine groups had adequate antibody titers ($>$0.5IU/ml) on all days tested post-vaccination and there was no significant difference in the titers observed ($p>0.05$). Some side effects like pain, induration, itching and fever were noted in both vaccine groups in all studies. Both vaccines were tolerated. Hence it can be concluded that Indirab is as safe and immunogenic as Verorab when administered by both intramuscular and intradermal routes.

48) M K Sudarshan, D H Ashwath Narayana (2010): A survey of

hospitals managing human rabies cases in India, Indian Journal of Public Health, Vol. 54, issue 1, 40-41.

A survey of 23 infectious diseases (ID) hospitals/ID wards of general hospitals was done during 2008-09 to assess the facilities for and management of rabies patients. All were Government hospitals and 0.5% of total beds were earmarked for rabies cases. The hospitals were mostly run by medical colleges (47.8%) and ID hospitals (30.4%) and located outside city limits (52.2%). The patients were admitted to 'rooms (39.1%)' and 'wards (43.5%)'. The general conditions of rabies sections i.e. sanitation and linen (65%), space and toilet (52% and 56%) and bed (47.8%) require improvements. There is a need to improve staff availability, use of personal protective wears, preventive vaccination of care providers and medicinal supplies. It is recommended to encourage hospitalization of human rabies cases to ensure a 'painless and dignified death' and this must be considered as a 'human rights' issue.

49) M K Sudarshan, Gangaboraiah, H S Ravish (2010): Whether higher antigenicity produces higher immunogenicity in intradermal Rabies vaccination? Results of a metanalysis. Journal of APCRI, Vol, 12 issue 1, 22-25.

The meta data of 10 published studies and 3 vaccine trial reports comprising of 19 vaccine cohorts from 4 countries conducted over a period of 23 years (1986 to 2009) was used for metanalysis. The vaccines studied were purified chick embryo cell vaccine (Rabipur, India and Germany), purified verocell rabies vaccine (Verorab, France; Indirab, India) & human diploid cell vaccine (MIRV, France). The potency of these vaccines varied from 0.55 IU to 2.23 IU per intradermal dose of 0.1ml per site. The vaccines were administered to 1011 subjects comprising of 19 cohorts and using five different ID regimens. The immunogenicity was measured by assays of rabies virus neutralizing antibody (RVNA) titers using rapid fluorescent focus inhibition test (RFFIT) [15 cohorts] and mouse neutralization test (MNT) [4 cohorts]. The statistical analysis of the data was done by Mann-Whitney test. The results showed that a higher antigenicity did not produce a significantly higher immunogenicity in intradermal rabies vaccination ($p>0.331$ & $p>0.482$).

The full articles can be accessed from
www.kimscommunitymedicine.org

5. Dissertations

The following post graduates did dissertation on rabies in the Department of Community Medicine, KIMS, Bangalore.

Sl. No.	Name of the PG student & PG period	Dissertation topic & Guide
1	 **Dr. B. J. Mahendra** PG Period: 1993-96	An evaluation of safety and efficacy of purified verocell rabies vaccine (PVRV) in pregnancy. Guide : **Dr. M. K. Sudarshan** Co-Guide : **Dr. S. N. Madhusudana**
2	 **Dr. D.H. Ashwath Narayana** PG Period: 1996-99	Clinical evaluation of safety and immunogenicity of rhesus diploid rabies vaccine (RDRV) in man. Guide : **Dr. M. K. Sudarshan** Co-Guide : **Dr. B. J. Mahendra**
3	 **Dr. T. V. Sanjay** PG Period: 1999-2002	A clinico-epidemiological study on the use of rabies immunoglobulin in post exposure rabies prophylaxis. Guide : **Dr. M. K. Sudarshan** Co-Guide : **Dr. B. J. Mahendra**
4	 **Dr. M.S. Anandagiri** PG period: 2001-2004	An evaluation of immunogenicity and reactogenicity of purified chick embryo cell rabies vaccine administered intradermally using a new simulated post exposure regimen in healthy adult volunteers. Guide : **Dr. M. K. Sudarshan** Co-Guide : **Dr B. J. Mahendra**

Sl. No.	Name of the PG student & PG period	Dissertation topic & Guide
5	 **Dr. G. M. Venkatesh** PG Period : 2003-2006	A clinical evaluation of a premedication protocol for administration of equine rabies immunoglobulin (ERIG) in patients known or suspected hypersensitivity. Guide : **Dr. M. K. Sudarshan** Co-Guide : **Dr. N. S. Kodandaram**
6	 **Dr. G. Praveen** PG Period : 2006-2009	Clinical evaluation of safety & immunogenicity of purified chick embryo cell vaccine (PCRCV) administered intradermally using updated Thai red cross regimen in animal bite cases. Guide : **Dr. D. H. Ashwath Narayana**
7	 **Dr. N. Shakila** PG Period : 2007-2010	Clinical evaluation of safety and immunogenicity of Indirab & Verorab using simulated updated Thai red cross regimen in healthy volunteers: Phase III, randomized controlled trial. Guide: **Dr. D. H. Ashwath Narayana**
8	 **Dr. Giriyanna Gowda** PG Period : 2008-2011	Clinical evaluation of safety and immunogenicity of purified chick embryo cell (PCECV) rabies vaccine administered intramuscularly in healthy volunteer. Guide: **Dr. D. H. Ashwath Narayana**

Sl. No.	Name of the PG student & PG period	Dissertation topic & Guide
9	 **Dr. Ramesh Holla** PG Period : 2009-2012	A clinical evaluation of safety and immunogenicity of purified chick embryo cell vaccine (PCECV, Rabipur) and purified Vero cell rabies vaccine (PVRV, Verorab) administered as simulated post exposure prophylaxis using one week intradermal regimen (4-4-4-0-0). Guide: **Dr. D. H. Ashwath Narayana**
10	 **Dr. Praveen Kulkarni** PG Period : 2009-2012	Implementation and evaluation of a novel rabies prevention strategy in rural field practice area of KIMS, Bangalore. Guide: **Dr. N.R. Ramesh Masthi**
11	 **Dr. Veena V.** PG Period : 2010-2013	Clinical evaluation of safety and immunogenicity of an indigenously developed purified chick embryo cell rabies vaccine when administered intradermally in animal bite cases. **Guide: Dr. H. S. Ravish**

6. Conferences, Seminars, Symposiums and Workshops

The following events were organized by the Department of Community Medicine, KIMS, Bangalore

1989

1. **Symposium on Rabies, 26th June, 1989**
   A one day symposium on rabies was organized by Karnataka Association of Community Health in collaboration with the Department of Community Medicine, KIMS. About 100 doctors from Bangalore City Corporation, Medical colleges, Directorate of Health Services and others attended the symposium.

Dr. M. K. Sudarshan, Professor of community medicine addressing the gathering

1996

2. **2nd National Seminar on Rabies**
   On the occasion of centenary year of Louis Pasteur, the 2nd National Seminar on Rabies was organized by the Department of Community Medicine, KIMS at Indian Medical Association, Bangalore. Dr. N. F. Mostefai, Pasteur Merieux Connaught, New Delhi was the chief guest. About 75 delegates attended the seminar.

Dr. N. F. Mostefai, Pasteur Merieux, France along with other dignitaries at the inaugural function of 2nd National Seminar on Rabies

2000

3. 2nd National conference of Association for Prevention and Control of Rabies in India (APCRI), 8-9th July, 2000.

Dr. F. - X. Meslin, WHO, Geneva, addressing the delegates

The 2nd National conference of APCRI was organized by the Department of Community Medicine, KIMS, Bangalore from 8- 9 July, 2000 at the National Institute of Advanced Studies, IISc Campus, Bangalore. The conference was inaugurated by Dr. F.-X Meslin, Chief, Zoonotic Division, WHO-Geneva. Sri. Basavegowda, Chairman, KIMS Governing council and Sri. A Krishnappa, Agriculture minister, Government of Karnataka and other dignitaries were present at the inaugural function. About 200 delegates from different countries participated in the conference.

2001

4. Workshop on Rabies, 31st March, 2001

A one day National workshop on rabies was jointly organized by APCRI, Department of Community Medicine, KIMS, and Department of Neurovirology, NIMHANS, Bangalore on 31st March, 2001 at NIMHANS, Bangalore. About 75 delegates from all over the country participated in the workshop to develop slides on rabies prophylaxis which was later sent to all APCRI members.

Dr. K.M. Srinivasa Gowda, Registrar, Rajiv Gandhi University of Health Sciences, Bangalore (4th from left) releasing the APCRI News Letter during the Inaugural programme

5. Orientation meeting of Principal Investigators of National Multi-Centric Rabies Survey, 24th February , 2003

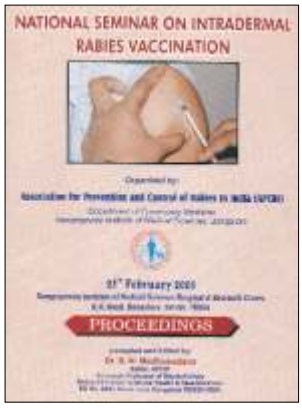
A one day meeting to brief the Principal Investigators of National multi centric rabies survey was held on 24th February, 2003 at KIMSH&RC, Bangalore for the proposed WHO-APCRI National Multi-Centric Rabies Survey. This programme was jointly organized by the Department of Community Medicine, KIMS, Bangalore and APCRI. 18 Principal Investigators from the different states of India had participated.

Principal Investigators along with the other dignitaries from WHO, WHO-SEARO & WHO-WPRO

6. Seminar on Intradermal Rabies Vaccine, 25th February, 2003

A one day seminar on Intra dermal rabies vaccination (IDRV) was held on 25th February, 2003 at the KIMSH & RC, Bangalore. The seminar was jointly organized by Department of Community Medicine, KIMS, Bangalore and APCRI. Experts in the field of rabies urged the need for introduction of IDRV in India in a phased manner. About 75 delegates participated in the programme.

Dr. L Krishna, Principal, KIMS along with the other dignitaries at the inaugural function of the seminar on IDRV



Proceedings of the National Seminar on IDRV

2005

7. International Symposium on Prevention & Control of Rabies, 18 - 19 March, 2005

A two day International Symposium on Prevention & Control of Rabies was held on 18-19, March, 2005 at NIMHANS Conventional Hall, Bangalore. The theme of the symposium was "Global rabies scenario: spotlight on the Indian subcontinent". The symposium was jointly organized by Cadila Health Care Ltd. in collaboration with the Department of Community Medicine, KIMS, Bangalore and Department of Neurovirology, NIMHANS, Bangalore. About 150 delegates from India and abroad had participated in the symposium. Dr. M K Sudarshan, Dr. D H Ashwath Narayana, Dr. N R Ramesh Masthi from the department made scientific presentation in the symposium.

Dignitaries at the Inaugural function

Dr. N R. Ramesh Masthi delivering a talk

2007

8. 1st Rabies in Asia conference (RIACON 2007), 3-4th March, 2007

The 1st Rabies in Asia Conference (RIACON 07) was held from 3-4, March, 2007 at NIMHANS Conventional hall, Bangalore. The conference was jointly organized by Rabies in Asia Foundation, Department of Neurovirology, NIMHANS & Department of Community Medicine, KIMS, Bangalore. About 100 experts in the field of Rabies from India & abroad, representatives from WHO and CDC, Atlanta, corporate representatives, BBMP medical officers and Medical college staff participated in the conference.

Group photo of RIACON 2007 participants

9. National workshop on Rabies Immunoglobulin (RIG) Administration: 3rd March, 2007

A one day national workshop on RIG administration was organized by the Association for Prevention and Control of Rabies in India (APCRI) and was held on 3rd March, 2007 at the Department of Community Medicine, KIMS, Bangalore. About 75 delegates from all over the country participated. A Manual on "RIG administration" was prepared during the workshop.

Dr. R. L. Ichhpujani, Additional Director, NICD, New Delhi (4th from left) at the inaugural function

7. Training Programmes

1) Training on RIG administration for doctors from Medical Colleges, Karnataka state, March 2005.

Dr D H Ashwath Narayana briefing about RIG administration at ARC, KIMS

2) Training of Trainers (TOT) programme on Intra Dermal Rabies Vaccination (IDRV) & RIG administration, June 2009.

A TOT programme for state government doctors on IDRV & RIG administration was conducted at Anti Rabies Clinic, KIMS Hospital & Research Centre, Bangalore-4 from 20- 27, June, 2009 in three batches. About 58 doctors were trained during the programme.

Dr D H Ashwath Narayana delivering talk on IDRV

Dr H S Ravish Discussing with medical officers on RIGs

3) Training Programme on Intra dermal rabies vaccination (IDRV) for BBMP doctors, March 2010.

A one day training programme on IDRV for BBMP Medical and health staff was held on 22nd March, 2010 at KIMS College, Bangalore –70. About 96 hospital staff from BBMP were trained in the newer concepts of IDRV.

Dr. D H Ashwath Narayana delivering lecture on IDRV

Dr H S Ravish providing hands on training on IDRV to BBMP Doctors

4) CME on Rabies for Interns of KIMS

Continuing medical education (CME) programme for intern of KIMS is being regularly conducted on IDRV & RIG administration.

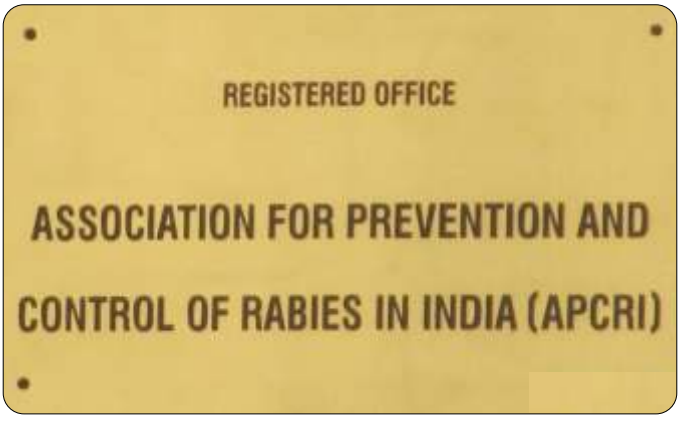
Dr H S Ravish conducting the CME programme

8. Professional Associations

The Department of Community Medicine, KIMS has registered offices for two professional scientific bodies.

1) Association for Prevention and Control of Rabies in India [APCRI]

Association for Prevention and Control of Rabies in India [APCRI] was founded in 2000 under Karnataka Societies Registration Act, 2000 with Headquarters at the Department of Community Medicine, KIMS, Bangalore.



The following faculty from the Department of Community Medicine, KIMS were nominated as office bearers of APCRI in the beginning-

Dr. M. K. Sudarshan, President

Dr. B. J. Mahendra, Secretary General and

Dr. D. H. Ashwath Narayana, Treasurer

Dr. M. K. Sudarshan officiated as President, APCRI from 2000-2004 and Advisor from 2004 to till date.

Dr. B. J. Mahendra officiated as Secretary General (2000-2004) & President (2004-06).

Dr. D.H. Ashwath Narayana officiated as Treasurer (2000-06) & Secretary General (2006-08)

Dr. H S Ravish officiated as Treasurer (2006-08).

The Department of Community Medicine, KIMS organized the following events in collaboration with APCRI:

a) 2nd National Conference of APCRI (APCRICON 2000) at NIAS, IISC campus, Bangalore.

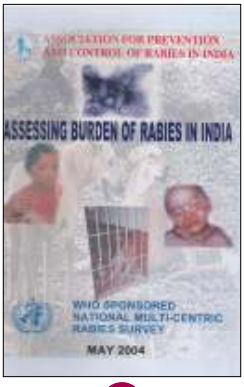
b) National workshop on rabies prophylaxis at NIMHANS in collaboration with Department of Neurovirology, NIMHANS in March 2001.

c) Drs. M K Sudarshan & B J Mahendra who were office bearers of APCRI met Former Union Health Minister Mr.Shatrughan Sinha in 2002 and convinced him to conduct feasibility study on Intradermal rabies vaccination (IDRV). IDRV was subsequently approved by Govt. of India/Drug Controller General of India in 2006 for use in ARC.

Shri. Shatrughan Sinha
Former Union Health Minister

d) National seminar on Intradermal rabies vaccination at KIMS Hospital, in 2003.

e) Participated in National multi centric rabies survey "Assessing burden of rabies in India" during 2003-04.



Report of WHO-APCRI National Multicentric Rabies Survey , May 2004

f) Drs M K Sudarshan & B J Mahendra submitted a memorandum to Sri. S M Krishna, Chief Minister of Karnataka in 2003, requesting to make availability of modern rabies vaccines & RIG in all Government hospitals in the state.

Dr. M.K. Sudarshan and Dr. B.J. Mahendra submitting the memorandum to Sri. S.M. Krishna, Chief Minister of Karnataka

g) National workshop on Rabies Immunoglobulin administration at KIMS Medical College, March, 2007.

h) The staff and Postgraduates, Department of Community Medicine, KIMS attended and made presentations during all conferences, Seminars, workshops organized by APCRI from 1st APCRICON held in 1999-Kolkata, 2000-Bangalore, 2001-Amritsar, 2002-Jaipur, 2003-Bhubaneshwar, 2004- Kolkata, 2005-Shimla, 2006-Jammu, 2007-Hyderabad, 2008-Lucknow, 2009-Thiruvanatapuram and 2010-New Delhi.

2) Rabies in Asia [RIA] Foundation

The Rabies in Asia (RIA) Foundation was founded under Indian Trust Act with Headquarters at the Department of Community Medicine, KIMS, Bangalore.

The following trustees as office bearers are in the Governing Council of RIA:

Dr. M. K .Sudarshan, President (2006 to till date)

Dr. B. J. Mahendra, Executive Director (2006 to 2009)

Dr. D. H. Ashwath Narayana, Treasurer (2006 to till date)

Executive Director (2009 to till date)

The Department of Community Medicine, KIMS organized the following events in collaboration with RIA Foundation:

a) The 1st International conference of RIA (RIACON 2007) held in March, 2007 at Convention hall, NIMHANS, Bangalore in collaboration with Department of Neurovirology, NIMHANS, Bangalore.

b) The state level quiz on rabies in September, 2008.

c) Implementing the medical component of Adopt a village- A rural rabies prevention project, 2009.

9. International Study Visits & Presentations

1993

1) Dr. M. K. Sudarshan made a scientific presentation at the WHO symposium on rabies at Jakarta and Bali, Indonesia in April/May, 1993, sponsored by Marcel Merieux Foundation.

1995

2) Dr M. K. Sudarshan made a scientific presentation at the "Louis Pasteur Symposium on Vaccines" at Pasteur Institute, Paris, France in Sept, 1995.

1996

3) Dr M. K. Sudarshan made a scientific presentation at the WHO Symposium on "Rabies in Asia" at Wuhan, China in Sept, 1996.

1998

4) Dr M K Sudarshan made a scientific presentation at the "Seminar on Rabies" at QSMI Hospital, Bangkok, Thailand in April, 1998.

2000

5) Dr. B. J. Mahendra & Dr. D. H. Ashwath Narayana, Assistant Professors made a presentation on rabies at the" International seminar on Rabies" at Bangkok, Thailand in 2000.

2002

6) Dr. M. K. Sudarshan made a scientific presentation at the "WHO Steering Committee on Rabies" at QSMI Hospital, Bangkok, Thailand in December 2002.

2003

7) Dr. M. K. Sudarshan, Dr. B. J. Mahendra and Dr. D. H. Ashwath Narayana made a presentation on Rabies at the International conference on Rabies, November 2003 at Katmandu, Nepal.

2006

8) Dr. M. K. Sudarshan presented "Summary report of Indian Rabies Survey, 2003" at the 4th annual conference of Infectious Diseases Society of Pakistan held at Karachi, Pakistan in March 2006.

Dr M K Sudarshan delivering talk at Karachi, Pakistan

9) Drs. M. K. Sudarshan, B. J. Mahendra and D. H. Ashwath Narayana participated in study on "Implementation of IDRV in Sri Lanka" in June, 2006, Colombo, Sri Lanka.

Visiting team with Director General of Health Services, Sri Lanka

Visiting team with Dr. Omala Wimalartna, Sri Lanka

10) Drs. M. K. Sudarshan, B. J. Mahendra and D. H. Ashwath Narayana participated in "Study of rabies prevention and control in Philippines" in October, 2006 Manila, Philippines.

Visiting team with Director of Health Services, Philippines

Visiting team with Health officials of RITM, Manila, Philippines

2008

11) Dr. M K Sudarshan, Dr. D H Ashwath Narayana and Dr. H S Ravish made a scientific presentation at the 1st International Symposium on Rabies, May 2008, Shanghai, China

2009

12) Dr. M K Sudarshan, Dr. D H Ashwath Narayana and Dr. H S Ravish made a scientific presentation at the 2nd International symposium on Rabies, May 2009, Hongkong, China

Dr D H Ashwath Narayana delivering a talk

13) Dr. M K Sudarshan, Dr. D H Ashwath Narayana, Dr. N R Ramesh Masthi and Dr. H S Ravish made a scientific presentation at the 2nd RIACON, Hanoi, Vietnam

Dr. M.K. Sudarshan, President, RIA Foundation during the inaugural programme

2010

14) Dr. M K Sudarshan, Dr. D H Ashwath Narayana, Dr. N R Ramesh Masthi and Dr. H S Ravish made a scientific presentation at the 3rd International symposium on rabies, Cairo, Egypt, December, 2010

Dr. M.K. Sudarshan, President, RIA Foundation delivering the talk

10. Individual accomplishments and Awards

Dr. M. K. Sudarshan
Dean, Principal and
Professor of Community Medicine,
KIMS, Bangalore – 560 070.
e-mail : mksudarshan@gmail.com

- Founder President: Association for prevention and control of rabies in India (APCRI): 1998-2004
- Founder President: Rabies in Asia (RIA) Foundation: 2006 to till date
- Member- WHO, Geneva, Switzerland-Expert Advisory Panel on rabies, 2004 and 2009
- Member- National expert committee on rabies, 2007
- Fellow of the National Academy of Medical Sciences, New Delhi, India, 2008
- Honorary Fellow, Faculty of Public Health, Royal Colleges of Physicians of United Kingdom, London, 2010
- Fellow, Royal Institute of Public Health and Hygiene (FRIPHH), London,
- Member, Royal Society of Health, England
- B.C Roy Award, Government of Karnataka, 2010
- Authored a Book on Rabies in Kannada published by Kannada Pusthaka Pradikara, Government of Karnataka.
- Authored a Book on Rabies prevention for professionals.
- Conducted many continued medial educational (CME) programme for professional all over the country.
- Published more than 50 articles in National & International Indexed scientific Journals.

Dr. B. J. Mahendra
Associate Professor of Community Medicine,
KIMS, Bangalore – 560 070.
(Presently Professor and Head, Department
of Community Medicine, MIMS, Mandya)
e-mail : mahendrabj@gmail.com

- Secretary General: Association for prevention and control of rabies in India (APCRI): 1998-2004
- President: Association for prevention and control of rabies in India (APCRI):2004-06
- Executive Director- Rabies in Asia (RIA) Foundation: 2006-2009: International Co-ordinator, RIA Foundation from 2009
- Young Scientist award bestowed by Karnataka Association for Community Health, 2000 for work on rabies.
- Conducted many continued medial educational (CME) programme for professional all over the country from 2000-2007.
- Presented many papers on rabies at National & International meets.
- Published more than 25 papers on rabies in National & international journals.

Dr. D. H. Ashwath Narayana
Professor of Community Medicine
KIMS, Bangalore - 560 070
e-mail : dhashwathnarayana@gmail.com

- Treasurer: Association for prevention and control of rabies in India (APCRI): 1998-2006
- Secretary General: Association for prevention and control of rabies in India (APCRI): 2006-08
- Treasurer- Rabies in Asia (RIA) Foundation: 2006 to till date
- Executive Director- Rabies in Asia (RIA) Foundation: 2010 to till date
- Young Scientist award bestowed by Karnataka Association for Community Health, 2002 for work in rabies.
- Presented many papers on rabies at National & International meets.
- Conducted many training and continued medial educational programmes (CME) programmes for professionals and for lay public through Radio & Television.
- Published more than 25 papers on rabies in National & international journals.

Dr. B. G. Parasuramalu
Professor and Head
Department of Community Medicine
KIMS, Bangalore - 560 070
e-mail : bgparasuramalu@yahoo.co.in

- Life Member- Association for prevention & control of rabies in India (APCRI).
- Attended national & International meets.
- Published papers on rabies.

Dr. H. S. Ravish
Associate Professor of Community Medicine
KIMS, Bangalore - 560 070
e-mail : drravishhs@rediffmail.com

- Treasurer: Association for prevention and control of rabies in India (APCRI): 2008-10.
- Young Scientist award bestowed by Karnataka Association for Community Health, 2009
- Young Scientist award bestowed by Association for prevention and control of rabies in India, during National conference of APCRI (APCRICON 2010) at New Delhi.
- Presented papers on rabies at National & International meets.
- Conducted many training and CME Programmes.
- Published papers on rabies in National & international journals.

Dr. T. V. Sanjay
Associate Professor of Community Medicine,
KIMS, Bangalore - 560 070
e-mail : sanjyoth03@yahoo.co.in

- Life Member- Association for prevention & control of rabies in India (APCRI).
- Medical Officer- Anti rabies clinic, KIMS Hospital (2002-04).
- Involved in many phase III & IV clinical trials.
- Presented papers on rabies at National conferences.
- Published papers on rabies in National & international journals.

Dr. N. R. Ramesh Masthi
Associate Professor of Community Medicine,
KIMS, Bangalore - 560 070
e-mail : ramesh.masthi@gmail.com

- Life Member- Association for prevention & control of rabies in India (APCRI).
- Principal Investigator (Karnataka) - WHO-APCRI National Multi centric rabies survey.
- Young Scientist award bestowed by Karnataka Association for Community Health, 2008
- Project Officer (Medical) - Adopt a village- A rural rabies prevention project.
- Co-ordinator- A video film on rabies "Rabies- A fatal but preventable disease" (English, 45 minutes).
- Organizing Secretary- State Level Quiz on rabies.
- Presented papers on rabies at National & International meets.

Dr. Gangaboraiah
Professor of Statistics
Department of Community Medicine
KIMS, Bangalore - 560 070
e-mail : nisargboraiah@gmail.com

- Life Member- Association for prevention & control of rabies in India (APCRI).
- Statistical Consultant - WHO-APCRI National Multicentric rabies survey, 2004.
- Statistical Assistance to all clinical trials conducted by the department.
- Published many papers on rabies in National & international Journals.

11. Other activities

1996

1) Introduction of pager services for the professional guidance to Rabies Prophylaxis.

   To commemorate the year of vaccines-1996 and on the occasion of 101 years of Louis Pasteur, on 28th September 1996, a novel and unique pager services was launched in Bangalore city, for guiding Medical and Veterinary professionals for proper rabies prophylaxis. The pager number was 9624-243410 sponsored by Pasteur Merieux Connaught, New Delhi.

2004

2) International Forum on Rabies Prevention (Inforab)" held at Baroda, India 8-10, September 2004.

   Dr. M. K. Sudarshan, Dr. B. J. Mahendra and Dr. D. H. Ashwath Narayana made a scientific presentation on rabies at the "International Forum on Rabies Prevention (Inforab)" held at Baroda, India 8-10, September 2004. They also visited the Chiron vaccine plant at Ankeleshwar, Gujarat.

Dr M K Sudarshan delivering the talk

Team Visiting Chiron Vaccine Plant

Dr. M.K. Sudarshan presented the results of national rabies survey
Dr. B.J. Mahendra presented on "Rabies Awareness"
Dr. D. H. Ashwath Narayana presented on
"Dilemmas in animal bite management"

2005

3) International Forum on Rabies Prevention (Inforab) Nov-Dec, 2005, Mumbai, India

Dr. M. K. Sudarshan spoke on "Education is the key to future- An outline of rural community rabies project"

Dr. B.J. Mahendra spoke on "APCRI& its activities"

Dr. D. H. Ashwath Narayana spoke on "Usage of RIGs- Current situation in India"

2006

4) During the 50th Annual National conference of Indian Public Health Conference (IPHA) held at Tirupathi, Andhra Pradesh in 2006 Drs. M K Sudarshan, B. J. Mahendra, D.H. Ashwath Narayana & M.S. Anandagiri spoke on rabies in a scientific session on rabies.

KIMS Team, at the 50th National Conference of IPHA, Tirupati

2007

5) Events of 1st World Rabies Day : 8th September, 2007

- Walk for Rabies was organized on Saturday, 8th September 2007 on M G Road between 2.30 PM to 3.30 PM to mark the world rabies day. About 160 medical students from KIMS & NIMHANS, office bearers of RIA Foundation, APCRI & celebrities from Kannada film world walked on M G Road holding banners and distributed Pamphlets on "Rabies & its prevention" to general public and also to residents of Bangalore through various News Papers.

- Awareness on "Rabies & its Prevention" and also on "World Rabies Day" was conducted through Television & Radio by Dr M K Sudarshan, & Dr D H Ashwath Narayana
- "Poster making competition" was organized by the Department of Community Medicine, Kempegowda Institute of Medical Sciences, Bangalore for the medical students & Interns of KIMS on the Theme "World Rabies Day" on 7th September, 2007.

Walk for Rabies during WRD, 2007

6) Annual Conference of Karnataka Association of Community Health (KACH) was organized by Department of Community Medicine, KIMS during 5-6, October, 2007. A scientific session on Rabies was organized on this occasion.

Dr. D H Ashwath Narayana delivering the talk

2008

7) Events of 2nd World Rabies Day : 28th September, 2008

- State level Quiz on Rabies, Saturday, 13th September, 2008.

  The Rabies in Asia, India Chapter and the Department of Community Medicine, Kempegowda Institute of Medical Sciences (KIMS), Bangalore organized a state level Quiz on Rabies for Medical and Veterinary under graduate students and Interns of Karnataka State. About 15 Medical colleges and 1 veterinary college participated in the quiz programme. The programme was inaugurated by Dr. S N Madhusudana, Chairman, Rabies in Asia (RIA), India Chapter. Dr. M K Sudarshan, President, RIA Foundation, Dr. S. Abdul Rahman, Vice President, RIA Foundation and other trustees of RIA were the other dignitaries present. Ms. Chethana K and Ms. Ghazal Dutta from Mysore Medical College, Mysore were the winners and received the cash prize of Rs.10,000=00. Ms. Sangeetha R P and Ms. Shruthi Shekar from Dr B R Ambedkar Medical College, Bangalore were the Runners and received the cash prize of Rs.5,000=00 .

Dignitaries at the Inaugural function of Quiz on Rabies, 2008

- **Poster Competition on Saturday, 27th September, 2008**

  On the eve of the World Rabies Day "Poster making competition" was organized for the Undergraduate students and Interns of KIMS. Miss. Jaya Pathak, Miss. Mytri Reddy and Miss. Krutika Natarajan of VII term won the competition. A cash prize along with mementoes was distributed to the prize winners.

- Walk for Rabies : Sunday, 28th September, 2008

  A Walk for Rabies for creating awareness on rabies was organized on Sunday, 28th September, 2008 in collaboration with Government Veterinary College. About 150 medical students and staff of KIMS along with staff of NIMHANS, office bearers of Rabies in Asia Foundation, Association for Prevention and Control of Rabies in India, Commonwealth Veterinary Association, Staff & Students of Government Veterinary College, Bangalore, Corporate Bodies etc participated in the Walk. The walk was organized in front of State Legislature House (Vidhan Soudha) Bangalore.


Walk for Rabies during World Rabies Day, 2008

2009

8) Events of 3rd World Rabies Day: 28th September, 2009

- Rabies Awareness programmes was conducted for school children of Bangalore City Municipal Corporation and their parents
- Pre exposure vaccination of school children of Bangalore City Municipal Corporation was conducted by intradermal route.

Dr. D.H. Ashwath Narayana addressing the school children

Administration of IDRV to school children

9) The 53rd Annual National Conference of Indian Public Health Association (IPHA) was organized by Department of Community Medicine, KIMS during January, 2009. A scientific session on "Intradermal rabies vaccination" was organized on this occasion

Dr. M.K. Sudarshan receiving the momento from Dr. Thomas Mathew, Chairperson of the scientific session

2010

10) Events of the 4th World Rabies Day: 28th September, 2010

On the occasion of World Rabies Day - 2010, "End Rabies Rally" was conducted by the Adopt a Village project implementation team at Kumbalgodu, Gerupalya and Tagachakuppe villages involving school children, teachers, village leaders, medical and veterinary professionals on Saturday, 25. 09. 2010. Drawing and painting competition was also organized for the school children about Rabies prevention on 23.09.10.

Events of 4th World Rabies Day, 2010

11) Rabies stall at Dasara Exhibition, Mysore, 12th –20th October,2010

Rabies in Asia (RIA) Foundation had established a "Rabies awareness stall" at the world famous Mysore Dasara from 12th - 20th October, 2010. The staff & PGs of the Department of Community Medicine, KIMS, Bangalore along with the team from Mandya Institute of Medical Sciences (MIMS), Mandya participated in the event. The KIMS team was lead by Dr. N. R. Ramesh Masthi, Associate Professor, Department of Community Medicine, KIMS, Bangalore. The stall was inaugurated by Sri. Madhusudana, MLC, Govt. of Karnataka, Mr. Devpal, President, Karnataka Vasthupradarshana Pradhikara (KVPP) and Mrs. Bharathi, Assistant Commissioner and working president of KVPP on Tuesday, 12th October, 2010 at 7.30PM.

The rabies education stall had various health education materials like Rabies information board, posters in both Kannada and English, placards, samples of anti rabies vaccines and Immunoglobulin. A rabies quiz both in Kannada and English was organized for students. Winners of the quiz were given prizes. A video films on rabies produced by RIA Foundation (for medical and veterinary professionals; Lay Public) were distributed to the visiting faculty of various teaching institutions. About 5000 people including 4000 school & college students had visited the stall. Dr. M K Sudarshan, Dean& Principal & Professor of Community Medicine, KIMS Bangalore and President Rabies in Asia (RIA) foundation along with other members had visited the stall on the concluding day 20.10.10 and had attended the valedictory programme.

Volunteers at Dasara exhibition stall

Health education to college students.

2011

12) A position paper on Rabies was presented at the 55th Annual National Conference of Indian Public Health Conference (IPHA) on 29th January, 2011 held at KLE University, Belgaum, Karnataka. This position paper was prepared under the chairmanship of Dr. M K Sudarshan, Dean & Principal, KIMS and President, Rabies in Asia Foundation. Dr. D. H. Ashwath Narayana, Professor of Community Medicine, KIMS and Executive Director, Rabies in Asia Foundation was the Rappoteur.

Dr. D. H. Ashwath Narayana making the presentation at IPHACON 2011, Belgaum, Karnataka