

## Annexure 1

### LIST OF TECHNOLOGIES DEVELOPED BY SELECT ICMR PERMANENT INSTITUTES / RESEARCH CENTERS

#### Group: Communicable Diseases

S. No	Name of the Laboratory	Technologies Developed
1.	National Institute of Virology, Pune	<p><b>Japanese Encephalitis Vaccine:</b></p> <p>Peptide sequences inducing neutralizing antibodies and T helper activity in mice were developed using combination of bioinformatics tools and the immunological studies. Chimeric peptides incorporating both these epitopes have exposed induction of immunity against JE virus and partial protection from lethal challenge in mouse model.</p> <p><b>Diagnostic for Japanese Encephalitis, Dengue and West Nile Viruses:</b></p> <p>It is used for diagnosis of recent JE, WN and DEN viral infections, which are of great public health importance. It is highly sensitive (96%) and specific.</p> <p><b>Diagnostic for Hepatitis A:</b></p> <p>The technology utilizes tissue culture grown HAV that provides a steady source of relatively clean preparation of virus (HAV) free from bacterial or other viral contaminants. The indigenous production of the following major components has been achieved:</p> <ol style="list-style-type: none"> <li>1. Rabbit IgG against human IgM.</li> <li>2. Anti-HAV IgG from serum of HAV infected human/rhesus monkey.</li> <li>3. HAV antigen</li> <li>4. HRP based immunoconjugate linked to purified anti-HAV IgG. The reagents of the kits are stable for 6 months.</li> </ol> <p><b>Vaccine for Hepatitis A:</b></p> <p>MRC-5/VERO cell culture adapted Indian isolate of Hepatitis A is proposed for the preparation of Hepatitis A vaccine. The indigenous vaccine preparation can be useful to high risk groups such as-</p> <ol style="list-style-type: none"> <li>1. Children from high socio-economic status</li> <li>2. Young food handlers</li> <li>3. Sibling of hepatitis A patients</li> <li>4. HBV/HCV carrier children.</li> </ol>

		<p><b>Kyasanur Forest Disease Vaccine:</b></p> <p>An inactivated vaccine is prepared using KFD virus in chick embryo culture (CEC).</p> <p><b>Diagnostic for Rotavirus for Diarrhea:</b></p> <p>This is use as an antibiotics for diarrhea patients. This kit is also useful during surveillance studies to obtain data on disease burden.</p> <p><b>Rotaviral Diarrhea Treatment:</b></p> <p>Anti-rotavirus antibody titers as assessed by ELISA and neutralization test are significantly high in hyper immune goat colostrum. Spray dried powder of hyperimmune goat colostrum retain anti-rotavirus antibodies which can be suitably used as baby food supplement.</p> <p><b>Mosquito Repellent Device:</b></p> <p>It is used as mosquito repellent where no electricity is available, particularly in rural areas.</p>
2.	Vector Control Research Centre, Pondicherry	<p><b>Biocontrol Agents for Mosquitoes:</b></p> <p><b>Bacillus thuringiensis</b></p> <p>Bacillus thuringiensis var. israelensis (Bti), a naturally occurring bacterial pathogen of mosquito larvae was isolated from the paddy fields of Pondicherry (strain VCRC B17).</p> <p><b>Bacillus sphaericus</b></p> <p>This is a mosquito pathogenic bacterial agent isolated from soil samples collected from paddy field near Pondicherry. It is rod shaped bacterium which forms spores at terminal position.</p> <p><b>Microbial pupicide:</b></p> <p>The formulation eliminates 100% of larvae, pupae within 24 h after application and maintains &gt;80% reduction in the pupal density for 10 days.</p> <p><b>Microbial Oviposition Attractant:</b></p> <p>The formulation shows remarkable attractancy to gravid females with an oviposition active index of +0.52.</p>

		<p><b>Insect Repellent:</b></p> <p>DEPA has been used as chemical control agent for personal protection against haematophagous arthropods. The repellent has been formulated as antiseptic cream, polymer based liquid and liposphere lotion.</p> <p><b>Insect Growth Regulator:</b></p> <p>DPE-28 is a fine yellow powder and used for the preparation of CRF with sodium carboxymethylcellulose slurry and insolubalization with aluminum ion.</p> <p><b>Immuno-suppressive Fungal Metabolite – Cyclosporine:</b></p> <p>It is laboratory scale process for the production of cyclosporine A and a HPLC method for the identification of cyclosporine A, B and C isomerism fermentation.</p> <p><b>Thrombolytic Enzyme – Thrombinase:</b></p> <p>This product is not a plasminogen activator, but it acts specifically on fibrin clots. Toxicological data have been generated through animal experimentation.</p> <p><b>Microfilaricidal Composition of Naphthalene Dione Derivatives:</b></p> <p><b>Plumbago rosea/indica</b></p> <p>A composition comprising of one or more derivative of 5-hydroxy-2-methy 1-1, 4-naphthalenedione may give rise to a potential macrofilaricide for treatment/prevention of filariasis.</p> <p><b>Trachyspermum ammi</b></p> <p>A composition comprising of one or more derivatives of monoterpene with phenolic properties is likely to yield a potential macrofilaricide.</p> <p><b>Bird Feather Based Biopesticide:</b></p> <p>It describes an economical process for producing bio-insecticide. It also describes the production of Bacillus sphaericus and B. thuringiensis serovar israelensis based biopesticides utilizing cheap and locally available biological waste material through simple fermentation technology. Potential mosquitocidal toxins are also identified from new fermentation medium.</p>
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3.	Centre for Research in Medical Entomogy, Madurai	<p><b>Diagnostic for Japanese Encephalitis:</b></p> <p>The technique is used for the diagnosis of JE using <i>Toxorhynchites splendens</i> larvae for isolation of the virus.</p> <p><b>Diagnostic for Dengue:</b></p> <p>This kit is used for the diagnosis of dengue fever by the detection of DEN virus infection in vector mosquitoes.</p> <p><b>Vector Control Tool for Japanese Encephalitis:</b></p> <p>These impregnated curtains used to prevent the entry of JE vector. This technology is basically developed for rural areas, which is endemic for JE.</p>
4.	National Institute of Cholera and Enteric Diseases, Kolkata	<p><b>Cholera Vaccine:</b></p> <p>Cholera vaccine strains closely mimics infection derived immunity. <i>Vibrio cholerae</i> O1 biotype E1 Tor serotype Inaba strain genetically tailored to develop a novel non-reactogenic oral recombinant live oral cholera vaccine strain and named VA1.3.</p> <p><b>Holey/Lacey Carbon Films for Electron Microscopy:</b></p> <p>New method for the preparation of holey/lacey supports film for electron microscopy. Holey films are also used for checking astigmatism, resolution and stability of the electron microscope.</p>
5.	Regional Medical Research Centre, Dibrugarh	<p><b>ELISA Technique for Sero-diagnostic for Human Paragonimiasis:</b></p> <p>This diagnostic process is especially used in cases of overlapping clinical manifestations and similarities between X-ray pictures in pulmonary paragonimiasis.</p>

6.	National Institute for Malaria Research, New Delhi	<p><b>New Formulation for Malarial Treatment:</b> This new formulation is used for treatment of malaria as gametocidal and schizontocidal drug.</p> <p><b>Herbal Composition for Mosquito Control:</b> This herbal composition is used as larvicidal agent for controlling mosquitoes.</p> <p><b>Micro-dot ELISA Diagnostic Assay for Malaria:</b> The developed assay system is used for determining malarial status, forecasting epidemics and to evaluate control programme by indigenous peptide ELISA.</p> <p><b>A New Plant Based Insecticide for Mosquito:</b> Valeriana jatamansi is a common plant distributed in mountains and Himalayas from Kashmir to Bhutan and has very good adulticidal activities against common vectors of malaria, filaria and dengue viz. Anopheles stephensis, Anopheles culicifacies, Aedes aegypti and Culex quinquefasciatus. These fractions also possess larvicidal activity.</p>
7.	Regional Medical Research Centre, Port Blair	<p><b>Diagnostic for Leptospirosis:</b> This test is used to diagnose the leptospirosis, endemic in Andaman &amp; Nicobar Islands, Kerala &amp; Tamil Nadu.</p>

**Group : Reproductive Health and Nutrition**

<b>S. No</b>	<b>Name of the Laboratory</b>	<b>Technologies Developed</b>
1.	National Institute for Research in Reproductive Health, Mumbai	<p><b>Fertility Assessment Kits</b></p> <p><b>a. Indulsa</b> - E1G assay is used in conjunction with either ovarian ultra sonography and / or cervical mucus score in:</p> <ol style="list-style-type: none"> <li>1. Monitoring induction of ovulation therapy.</li> <li>2. For timing the retrieval of preovulatory oocyte in vitro fertilization and Assisted Reproductive Technology (ART) programmes.</li> </ol> <p><b>b. Corpulisa</b> - PdG assays is used for:</p> <ol style="list-style-type: none"> <li>1. Detection for occurrence of ovulation.</li> <li>2. Assessment for corpus luteum function.</li> </ol> <p><b>c. Luteolisa</b> - LH assay is used in conjunction with FSH and / or sex steroids hormone in-</p> <ol style="list-style-type: none"> <li>1. Investigation in delayed and precocious puberty.</li> <li>2. In determining the cause of subfertility such as gonadal failure, polycystic ovarian disease and evaluation of hypothalamic pituitary gonadal axis.</li> </ol> <p><b>d. Follilisa</b> - FSH assay is used for estimation of FSH in urine. It is used in conjunction with LH assay for the above disorders.</p> <p><b>Pregnancy Detection Kit – Pregstrip;</b>  Pregstrip is a dipstick ELISA test for pregnancy detection. Pregnancy detection is very simple and convenient due to the concentrated coating of high affinity antibodies on the nitrocellulose membrane pad for precise detection. Its sensitivity, specificity, and accuracy is 99.2%, 99.6% and 99.84% respectively, and detects pregnancy just after period is missed.</p> <p><b>Iron Deficiency Detection – Ferritine:</b>  Ferritine provides a reliable immunoassay with minimum detection of limit 1.7 ng/ml. The antibody developed is specific and shows negligible cross reactivity with other</p>

		<p>serum component such as human serum albumin, alpha foetoprotein, haemoglobin, transferrin and ferric chloride. The test is cost effective, more sensitive and stable at refrigerator temperature. It is regularly required for screening general population, blood donors and patients undergoing renal dialysis.</p> <p><b>Biochemical Marker for Osteoporosis:</b></p> <p>Weakening of bone is an age related phenomenon and more so in geriatric population. Early diagnosis by using osteocalcine can reduce the incidence of future risk of fracture.</p> <p><b>Biochemical Marker for Reproductive Tract Infections:</b></p> <p>Elastase, which is one of the proteins released during the inflammation due to the infection, is used as biochemical marker for RTIs.</p> <p><b>Nisin Peptide - A Contraceptive:</b></p> <p>It is used as non vaccine preventive measure for RTIs/HIV infection and possess spermicidal properties.</p>
2.	National Institute of Nutrition, Hyderabad	<p><b>Kit for Estimation of Haemoglobin:</b></p> <p>Nutritional anemia is a public health problem in the world. In India, the prevalence of anemia is very high in the vulnerable segments of the population viz. women and children. Estimation of hemoglobin in field setting is carried out by accurately delivering a measured amount of blood of 20 microliter using calibrated pipette from a finger prick sample. The present technology eliminates the use of the above delivery procedure.</p> <p><b>Diagnostic Kit for Serum Ferritin:</b></p> <p>This kit is used for the measurement of serum ferritin which is considered to be an accurate and convenient method to estimate body iron.</p> <p><b>Fortified Common Salt for Prevention of Deficiency Disorders:</b></p> <p>To improve micronutrients status of population to prevent deficiency disorders due to iodine or / and iron. The fortified salt can also be used for cattle.</p>

		<p><b>Salt Testing Kit:</b></p> <p>To estimate quickly iodine/iron content of fortified salt under field conditions.</p> <p><b>Herbal Leaf Powder for Tibial Dyschondroplasia in Poultry:</b></p> <p>This new formulation is used as source of nutritional manipulation in the feed of poultry to improve the bone strength and egg shell thickness. In broilers, it increases bone weight, density, strength and body weight on one hand and reduces the bone disease tibial dyschondroplasia on the other.</p> <p><b>Immunodiagnostic Kit For Streptococcus agalactae:</b></p> <p>It is used for the detection of sub-clinical infections in laboratory animals. It is applicable in veterinary medicine, bovine streptococcal mastitis and dairy farms. It is also applied to monitor the infection in throat, UTI, neonatal septicemia and septic abortions.</p>
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**Group: Non-Communicable Diseases**

<b>S. No</b>	<b>Name of the Laboratory</b>	<b>Technologies Developed</b>
1.	Institute of Cytology and Preventive Oncology, Noida	<p><b>Cancerous Lesion Visualizing Device – Magnivisualiser:</b></p> <p>Application/Uses: It is used for visualizing precancerous lesion of uterine cervix. It magnifies and illuminates the cervix to see lesion at very early stage. It is extremely useful for that Primary Health Centre where no electricity is available.</p> <p><b>Human Papilloma Virus Testing Method:</b></p> <p>Paper smear can be employed for collection of almost all types of cytologic specimens for molecular analysis such as blood, cervical scrape/smear, fine needle aspirates, ascitic fluid, urine, sputum, amniotic fluid, semen, biopsy imprints and all cultured specimens. The samples can be stored in dry form at room temperature for 10-12 years.</p>
2.	Desert Medicine Research Centre, Jodhpur	<p><b>Mechanical Mosquito Sampler:</b></p> <p>The sampler with its retractable front tubing's is able to search mosquitoes/snaffles resting on wall, roof or hanging objects about 1 meter from the stretch and out hand of the collector, which gives an advantage to sample the objects virtually from any nook and corner of a room in rural households.</p>

**Group: Basic Medical Sciences**

<b>S. No</b>	<b>Name of the Laboratory</b>	<b>Technologies Developed</b>
1.	Institute of Pathology, New Delhi	<p><b>Detection of Kala-azar and Post Kala-azar Dermal Leishmaniasis:</b></p> <p>The test provides a diagnosis of Kala-azar and PKDL with 96% sensitivity.</p> <p><b>Monoclonal Antibody for Chlamydia trachomatis:</b></p> <p>It is used for the diagnosis of Chlamydia trachomatis infection.</p>
2.	Institute of Immunohaematology, Mumbai	<p><b>Monoclonal Antibody Development of Foetal Haemoglobin:</b></p> <p>Murine monoclonal antibody is used accurately to quantitate the cells at low and high values of HbF. This antibody is also used for isolation of foetal cells from the maternal blood by flow cytometry for non-invasive prenatal diagnosis.</p>