

**EoI No.** **ICMR/EoI/ Typhoid &Paratyphoid Vaccine /2025**

**Invitation for Expression of Interest (EoI)**

**For `**

**Joint Development & Commercialization of Typhoid & Paratyphoid Vaccine**

**By ICMR-Hqrs**

**Indian Council of Medical Research**

**(Department of Health Research, GoI)**

**V. Ramalingaswami Bhawan,**

**P.O. Box No. 4911, Ansari Nagar,**

**New Delhi - 110029, Ind**

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**Letter of Invitation**

1. **Invitation for Expression of Interest**

Indian Council of Medical Research ((ICMR), New Delhi invites Expression of Interest (EoI) from the eligible organizations, companies, manufacturers for undertaking **‘Joint development and commercialization’** Typhoid & Paratyphoid Vaccine

The EoI document containing the details of qualification criteria, submission details, brief objective & scope of work and evaluation criteria etc. can be downloaded from the ICMR website (<https://www.icmr.gov.in>).

Schedule for the Proponents is as under :

|  |  |
| --- | --- |
| EoI Document Number | EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025 |
| Date of Publication | Date 07 /02/ 2025 |
| Last date of submission | Date:07/04/ 2025 |

**Note:**

Interested applicants may please send their proposals in a sealed envelope to the following address:

Dr. Leyanna Susan George

Scientist –E

Division of Communicable Diseases, Room Number-304

Indian Council of Medical research (ICMR) HQ

V. Ramalingaswami Bhawan, P.O. Box No. 4911

Ansari Nagar, New Delhi - 110029, India

Call / WhatsApp : 91 9995688411

Email address : [george.leyanna@icmr.gov.in](mailto:george.leyanna@icmr.gov.in)

EoI Document No. “ICMR/EoI/01/ Typhoid & Paratyphoid Vaccine/2025” along with the title of the EOI as “**EoI for Technology Transfer/ Material Transfer/ Joint Development**” in **Bold** and complete address as above must be clearly mentioned on the sealed envelope.

ICMR reserves the right to cancel this EoI and/ or invite afresh with or without amendments, without liability or any obligation for such EoI and without assigning any reason. Information provided at this stage is indicative and ICMR reserves the right to amend/add any further details in the EoI, as may be desired by the Competent Authority ICMR and duly notified on its website.

1. **Background**

The Indian Council of Medical Research (ICMR), New Delhi, the apex body in India for the formulation, coordination and promotion of biomedical research, is one of the oldest medical research bodies in the world. The ICMR has always attempted to address the growing demands of scientific advances in biomedical research on the one hand and the need of finding practical solutions to the health problems of the country, on the other.

ICMR- NIRBI Institute, one of the constituent Institutes of the Indian Council of Medical Research (ICMR), New Delhi (ICMR-National Institute for Research in Bacterial Infections P-33, C.I.T. Road, Scheme XM, Beliaghata, Kolkata-700010.) has developed a technology entitled “Enteric fever vaccine based on Outer membrane Vesicles from two different strains of Typhoidal *Salmonelle* species” (hereinafter) referred to as **“Technology”.**

ICMR is lawfully entitled to enter into any form of **exclusive/non-exclusive agreements** with eligible manufacturing companies hereinafter referred to as the **“Company”** through a defined agreement for Licensing/Commercialization of Typhoid & Paratyphoid Vaccine, hereinafter referred to as the **‘Product’,** which shall be governed by ICMR IP Policy, as revised and approved by the Competent Authority.

1. **Objective**

**i. To validate the technology “broad specificity Typhoid & Paratyphoid vaccine against *Salmonella* Typhi, *Salmonella* Paratyphi ” developed at ICMR-NIRBI, Kolkata**

**ii. To develop the product “broad specificity Typhoid & Paratyphoid vaccine against *Salmonella* Typhi, *Salmonella* Paratyphi and *Salmonella* Typhimurium” with proper regulatory compliances and it’s commercialization & marketing.**

To license the ‘Technology’ for Typhoid & Paratyphoid Vaccine effective/useful in Typhoid & Paratyphoid Vaccine (2), for commercialization and marketing activities or to undertake joint development/ further development and commercialization of Vaccine candidate to undertake Material Transfer.

1. **Scope of Work**
2. ICMR is willing to collaborate with eligible organizations, companies, and manufacturers for undertaking validation, joint development and commercialization of Product i.e. broad specificity Typhoid & Paratyphoid vaccine, in two phases:

Phase I: Independent validation of the broad specificity Typhoid & Paratyphoid vaccine vaccine developed by ICMR-NIRBI Kolkata.

Phase II: Joint R&D and co-development of the broad specificity Typhoid & Paratyphoid vaccine candidate for further scaleup, and regulatory permissions, clinical trial, commercialization, and marketing etc

1. The Company would be granted rights to undertake scientific/technical validation of the ‘Technology’ as a Phase-I, only after signing of a non-disclosure agreement (NDA) further development, manufacture, sell, and commercialize the Technology/Product vaccine (Typhoid & Paratyphoid Vaccine ) or undertake further R&D and commercialize the end product(s) /technology.
2. An Agreement following EoI is proposed to be executed on Non-exclusive basis with single/multiple companies to enable wider outreach of the broad specificity Salmonella Vaccine for societal benefit and public health use. All the related issues shall be governed by ICMR IP Policy, as revised and approved by the Competent Authority.
3. ICMR-NIRBI Institute has expertise in various techniques, methods, information, technical-know-how relating to aforesaid technology which could be used for the co-development of broad specificity Typhoid & Paratyphoid Vaccine.

**Role of ICMR:**

1. ICMR-NIRBI Institute will provide expert guidance & technical support for the production of Typhoid & Paratyphoid vaccine in all phases. Such technical oversight by ICMR-NIRBI Institute would accelerate the development of the Product and its commercialization.
2. ICMR would provide technical support through its team of experienced scientists in study planning, product development, development of study protocol, results/data analysis, outcome assessment, safety & efficacy assessment, product improvement, etc., if deemed fit upon the mutual understanding between ICMR and collaborative company.
3. ICMR through its Institutes would provide support and facilitation to conduct the R&D/clinical study of new technology/ product in India through its Affiliates/ Institutes, in collaboration with the company/institutions in a professional and mutually agreed-upon manner and timelines, which will be decided later under the Agreement.
4. ICMR would provide technical support in development of technology/ product and will also facilitate the validation, if required, as per the terms & conditions of the Agreement.
5. ICMR shall have no financial implications unless otherwise specified.

**Role of Company**

1. The Company shall have valid provisions to provide all necessary infrastructure/ material/ manpower required for product development/ validation/ scale-up either directly or otherwise.
2. The Company shall have provisions to undertake the scale-up as required, manufacturing and commercialization of the Typhoid & Paratyphoid vaccine 1), in a set milestone.
3. The Company agrees to share the technical data with ICMR and participate in all discussions in a professional and mutually agreed-upon manner.
4. The Company agrees to allow authorized personnel/scientist/team of ICMR to visit the designated lab/ production facility as and when required, as envisaged under this EoI and subsequent Agreement.
5. The Company shall be responsible for obtaining all the regulatory approvals required for commercialization or starting from R&D for product development to its commercialization
6. **Intellectual Property Rights**

It is submitted that in case of transfer of Technology, ICMR is the sole owner of the said Technology, including any underlying Intellectual Property(ies) and commercialization rights.

Intellectual Property (IP) shall mean patents, rights to inventions, copyright and related rights, moral rights, rights in designs, rights in trademarks, rights to preserve the confidentiality of information (including know-how and trade secrets) and any other intellectual property rights, in each case whether registered or unregistered and including all applications (or rights to apply for and be granted), divisional, continuations, continuations-in-part, reissues, renewals or extensions of, and rights to claim priority from, such rights and all similar or equivalent rights or forms of protection which subsist or will subsist now or in the future in any part of the world regarding subject matter disclosed in Licensed patents.

ICMR legally possess the rights and authority to retain full or part of the ‘Technology’ by itself or to assign at its discretion full or part of the Technology including any patent(s) or intellectual property rights(s) or the invention(s), and/or ICMR is lawfully entitled to enter into any form of non-exclusive License Agreements with selected companies including transfer of the Technology through suitable Agreement(s).

In case of collaboration between ICMR and the Company for the Joint development of the Technology/ Product, Background Intellectual Property (“BGIP”) shall always remain the sole and exclusive property of the Party generating the BGIP. Any IP, if generated during the course of collaboration, including any improvement thereof, shall be jointly owned by ICMR and the Company.All such provisions related to intellectual property rights shall be governed by ICMR IP Policy, as revised and approved by the Competent Authority.

1. **Process involved in Partnership/Collaboration/Technology Transfer**

Interested companies/manufacturers are invited to join hands with ICMR for co-development/ further development & commercialization of the Technology/ Product(s). Under this EoI, the manufacturers/companies who are responsive and fulfilling all the technical need will be shortlisted based on their R&D plan, facilities and capabilities. Qualified companies/manufacturers will only be contacted for execution of MoA/MoU/Agreement for partnership/collaboration/technology transfer, etc. Subsequent to the execution of the Agreement such companies/manufacturers shall be responsible to pay the Royalty @ 2% on Net sales, as applicable, according to the ICMR Guidelines for Technology Development Collaboration.

1. **Publication**
   * 1. In case of Co-development, the Parties shall have equal rights on the manuscripts/scientific publications (joint publication/acknowledgment /other credits as applicable) and in accordance with guidelines of International Committee of Medical Journal Editors (ICMJE.org).
     2. Support of ICMR must be duly acknowledged in all publications by the Company.
     3. ICMR Scientists can be given due to advantage of authorships in the publications arising out of Licensing/co-development.
2. **Data Rights**

i. Data Rights will be exclusively with ICMR, if ICMR provide 100% funding.

ii. Data rights shall be jointly owned by ICMR and Licensee/Co-developer, in case of joint funding.

iii. Data rights in cases where Artificial Intelligence is involved shall be dealt separately.

iv. Licensee/ Company to ensure that data is anonymized, kept confidential and strictly abide by the provisions of Information Technology Act, 2000 while dealing with such data

1. **Details of documents to be furnished**

Proponents are requested to go through all pre-qualification requirements, scope of work for execution & requirements with respect to technical capabilities for submission of interest, subject for verification by ICMR.

Documents to be furnished are as follows:

1. Declaration - Expression of Interest (Format – 1)
2. Authorization Letter (Format – 2)
3. Undertaking with regard to Blacklisting (Format-3)
4. Undertaking with regard to Non-Conviction (Format – 4)
5. EoI document with each page duly stamped and signed by the Authorized signatory.
6. Undertaking with regard to laboratory facility (Format – 5)
7. Production Capacity Undertaking (Format-6)
8. Supporting documents, as mentioned in Format-1
9. MSME Certificate (if applicable)
10. Concept note on business plan- A brief concept note on R&D, clinical studies, planning & execution, production, marketing etc. with timeline (not more than 5 pages)
11. Any other information which proponent may wish to provide to support the EoI.

ICMR reserves the right to call for any clarifications confined in the broad scope, wherever such a clarification become necessary for proper judgement in evaluation.

1. **Rejection Criteria**

The application is liable to be rejected if:

1. The proposal is not submitted as per the requirements indicated in the EoI.
2. Not in the prescribed format.
3. Not properly stamped and signed.
4. Received after the expiry of due date and time.
5. All relevant supporting documents are not furnished with the Pre-Qualification Criteria (PQC).
6. The proposal shall be substantially responsive without any material deviation, failing which the proposal shall be summarily rejected.
7. Applications not fulfilling the terms of the document will be summarily rejected.
8. Any other non-compliance.
9. **Evaluation Methodology**

Screening of EoIs shall be carried out as per Pre-Qualification criteria mentioned in the EoI document and based on verification of documents submitted.

1. **Pre-Qualification Criteria (PQC)**

The following will be the minimum Pre-Qualification Criteria (PQC). Responses not meeting the minimum PQC will be summarily rejected and will not be evaluated further:

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **Pre-Qualification Criteria (General)** | **Supporting copy of documents required** (All documents must be self-attested by the authorized person of the proponent) |
| **General Criteria** | | |
| 1 | The proponent shall be a legal entity, registered as Institution/Company/ LLP/ Society/ partnership firm/ proprietorship firm under respective acts in India and shall have more than 51% of Company stakes by promoters from India. | Registration of firm/ organization/Company Incorporation Certificate from Registrar of Companies (ROC) /Partnership deed etc. whichever is applicable |
| 2 | The proponent must be registered in India with taxation and other administrative authorities. | GST Registration or GST exemption certificate/ PAN Card |
| 3 | The proponent should have proven prior experience of manufacturing and/or R&D with manufacturing during the last three years, either in-house or through agreed collaboration and must have marketed same/similar products in the past with a good track record. | Research paper/Pamphlet / brochure of the product/DCGI License for existing product.  Supporting documents for collaboration, if any. |
| 4 | The proponent has to be profitable and should not have incurred overall loss in past three (3) years. (applicable on commercial firms/organizations only) | Certificate from the Chartered Accountant of the Organization/ Audited Balance sheets for last three financial years or Income Tax return. |
| 5 | The proponent should have good track record and currently not black-listed/ barred by any Central / State Government / Public Sector Undertaking, Govt. of India, (applicable on commercial firms/organizations only). | Undertaking on the Letter Head of the Proponent duly signed & Stamped by Authorized Signatory (As per format – 3). |
| 6 | The proponent should have a  manufacturing unit in India. | Registration copies/ factory license/ DSIR certificate, if have any. |
| 7 | The proponent and its promoters should not have been convicted for any offence in India by any competent court or judicial body during the past 3 years. | Undertaking on Proponent’s Letter Head, duly signed and stamped by the Authorized Signatory (As per format – 4) |
| 8 | GMP/ quality certification (ISO or approved Indian certification) of manufacturing facility and GLP/ necessary certifications for R & D | Copies of Certificates |
| **Specific Criteria (Based on the nature of the Proposal)** | | |
| 9. | The proponent should have functional laboratory to carryout R&D for the product development | Undertaking on Proponent’s Letter Head, duly signed and stamped by the Authorized Signatory (As per format – 5) |
| 10. | Capacity to produce at least………………(quantity) per week | Undertaking (As per format – 6) |

NOTE- For MSMEs and Start-ups, Start-Up-India, Make-in-India and other relevant guidelines of Government of India shall be applicable

1. **Disclaimer**
2. ICMR shall not be responsible for any late receipt of applications for any reasons whatsoever.
3. ICMR reserves the right to cancel the call for EoI without assigning any reasons thereof.
4. ICMR may relax or waive any of the conditions stipulated in this document as deemed necessary in the best interest of the ICMR without assigning any reasons thereof.
5. To include any other item in the Scope of work at any time after consultation with proponents or otherwise.
6. For International Clients, please note that EoI and other necessary correspondences shall be submitted in English only.
7. **Arbitration**

That any dispute and/ or any part of the dispute which couldn't be resolved through mutual consultation, the same shall be referred to the sole arbitrator as per the Arbitration & Conciliation Act, 1996 and any amendment thereafter. The Venue and Seat of the arbitration proceedings shall be New Delhi and the courts at New Delhi will have exclusive jurisdiction.

1. **Contacts**

In case of any clarification required, please contact:

**For scientific issues-**

**Dr Hemanta Koley, M.Sc.; PhD , FAScT**

**Scientist –F, AcSIR Professor**

**Division of Bacteriology**

**ICMR-National Institute for Research in Bacterial Infections**

**(Indian Council of Medical Research)**

**P-33, C.I.T. Road, Scheme-XM, Beleghata**

**P.O. Box 177, Kolkata 700010, INDIA**

**Cell /WhatsApp : 91 9831031307**

**Email address : hemantakoley@hotmail.com ;** [**koleyh.niced@gov.in**](mailto:koleyh.niced@gov.in)

**Format-1**

**Expression of Interest**

(To be submitted on Company’s Letter Head)

To,

**The Director General,**

Indian Council of Medical Research,

Ansari Nagar, New Delhi.

**Subject:** Submission of Expression of Interest (EoI) for Joint collaboration in R&D and manufacturing, commercialization of Salmonella Vaccine useful against blood diarrhoea / salmonellosis disease.

**Ref:** EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025

Sir,

The undersigned having read and examined in detail all the EoI documents pertaining to your transfer of technology, and do hereby express the interest to undertake the research & development/manufacture/ sale /commercialization of the product as mentioned in the EoI document. The details of the Company and contact person are given below:

|  |  |
| --- | --- |
| Name of the Proponent |  |
| Address |  |
| Name, designation & address of the person (to whom all communications shall be made) |  |
| Telephone No. (with STD code) |  |
| Mobile No. of the contact person |  |
| Email ID of the contact person |  |

The following documents are enclosed:

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Documents required** | **Type of document**  **attached** | **Page No.** |
| 1 | Company Incorporation Certificate from ROC/Partnership deed etc. |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 2 | GST Registration or GST exemption certificate/ PAN Card. |  |  |
| 3 | DCGI/CDSCO license for the existing products available in the market |  |  |
| 4 | Certificate from the Chartered Accountant of the Organization/ Audited Balance sheets for las three financial years, Income Tax return. |  |  |
| 5 | Proof of a registered office and a manufacturing Unit in India. Including DSIR certificate |  |  |
| 6 | GMP **/** GLC and ISO Certification. Registration copies of both |  |  |
| 7 | Authorization Letter | As per format – 2 |  |
| 8 | Undertaking on the Letter Head of the Proponent duly signed & Stamped by Authorized Signatory | As per format – 3 |  |
| 9 | Undertaking on Proponent’s Letter Head, duly signed and stamped by the Authorized Signatory | As per format – 4 |  |
| 10 | MSME Certificate (if have any) |  |  |
| 11 | Business Plan | A brief concept note on planning & execution, production, marketing etc. (not more than 5 pages) |  |

I/we hereby declare that my/our EoI is made in good faith and the information contained is true and correct to the best of my/our knowledge and belief.

Thanking you,

Yours faithfully,

(Signature of the Authorized signatory)

Name:

Designation:

Seal:

Place:

**Format-2**

**Authorization Letter**

(To be submitted on Company’s Letter Head)

To,

**The Director General,**

Indian Council of Medical Research,

Ansari Nagar, New Delhi.

**Subject:** Letter for Authorized Signatory

Ref: EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025

Sir,

This has reference to your above-mentioned Expression of Interest (EoI) for Joint collaboration in R&D and manufacturing, commercialization of Salmonella Vaccine useful against blood diarrhoea / salmonellosis disease.

Mr./Ms./Mrs./Dr……………….is hereby authorized to submit the EoI documents and participate in the processing on behalf of M/s………. (Company Name) ……., who’s signature is below.

(Specimen Signature of Representative)

Date:

Place:

Yours faithfully,

(Signature of the Authorized signatory)

Name:……………………..

Designation:……………………..

Seal:…………………………..

**Format-3**

**Undertaking with regard to blacklisting**

(To be submitted on Company’s Letter Head)

To,

**The Director General,**

Indian Council of Medical Research,

Ansari Nagar, New Delhi.

**Subject:** Undertaking regarding Blacklisting / Non-Debarment.

**Ref:** EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025

Sir,

It is hereby confirmed and declared that M/s………………… (Company Name) currentlyhas not been blacklisted / debarred by any Government Department / Public Sector Undertaking / or any other company for which works/assignments/services have been executed / undertaken.

Yours faithfully,

(Signature of the Authorized signatory)

Name:

Designation:

Seal:

Place:

**Format-4**

**Undertaking with regard to Non-Conviction**

(To be submitted on Company’s Letter Head)

To,

**The Director General,**

Indian Council of Medical Research,

Ansari Nagar, New Delhi.

**Subject:** Undertaking regarding Non-Conviction.

**Ref:** EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025

Sir,

It is hereby confirmed and declared that M/s….............................(Company Name) and owner of the firm / board of directors, have not been convicted for any offence in India by any competent court or judicial body during the past 3 years.

Yours faithfully,

(Signature of the Authorized signatory)

Name:

Designation:

Seal:

Place:

**Format-5**

**Undertaking with regard to laboratory facility**

(To be submitted on Company’s Letter Head)

To,

**The Director General,**

Indian Council of Medical Research,

Ansari Nagar, New Delhi.

**Subject:** Undertaking regarding laboratory infrastructure.

**Ref:** EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025

Sir,

It is hereby confirmed and declared that M/s…........................... (Company Name) do have

* + - 1. Adequate laboratory infrastructure (equipped laboratory facility). Please tick BSL-2/BSL-3/ABSL-3/GMP/GLP/ Other\* (if other please specify) and

Adequate no. of experienced staff/ skilled manpower to undertake manufacture/research/ commercialization of vaccine against blood diarrhoea / salmonellosis disease.

Yours faithfully,

(Signature of the Authorized signatory)

Name:

Designation:

Seal:

Place:

**Format-6**

**Undertaking with regard to production capacity**

(To be submitted on Company’s Letter Head)

To,

**The Director General,**

Indian Council of Medical Research,

Ansari Nagar, New Delhi.

**Subject:** Undertaking with regard to production capacity.

**Ref:** EoI No. ICMR/EoI/ Typhoid &Paratyphoid Vaccine/2025

Sir,

It is hereby confirmed and declared that M/s……………………… does have the capacity in all mean (including infrastructure, fund, material, staff etc.) for manufacturing of any previously successful Vaccine (Name of Technology/Product), minimum (mention the quantity per week /per month).

Yours faithfully,

(Signature of the Authorized signatory)

Name:

Designation:

Seal:

Place:

**SCHEDULE-A**

**TECHNOLOGY DETAILS**

1. **About the Technology/Product/Process:**

The innovative technology described in this study focuses on the development of a **bivalent typhoidal Outer Membrane Vesicle (OMV)-based immunogen** to combat enteric fever, a disease caused by *Salmonella Typhi* and *Salmonella Paratyphi A*. Enteric fever remains a significant global health issue, with no existing combination vaccine to protect against both causative agents. This technology addresses this gap by formulating a novel vaccine candidate that shows promise in preclinical testing.

Key features of the technology include:

1. **Isolation and Characterization of OMVs**:
   * Outer Membrane Vesicles (OMVs) were isolated from *Salmonella Typhi* and *Salmonella Paratyphi A*.
   * These OMVs were comprehensively characterized to identify associated antigens, such as lipopolysaccharide (LPS) and Vi-polysaccharide.
2. **Immunization and Immune Response**:
   * Adult mice were immunized orally with three doses of the bivalent OMV-based immunogen (25 μg/200 μl).
   * The immunization induced robust humoral responses, including significant serum IgG levels against LPS and Vi-polysaccharide.
   * It activated specific immune cell populations, such as CD4, CD8, and CD19, in the spleen of immunized mice.
   * The vaccine also stimulated Th1 and Th17 cell-mediated immune responses.
3. **Protective Efficacy**:
   * Immunization with the bivalent OMVs provided protection against systemic infection caused by lethal doses of heterologous *Salmonella* strains in adult mice models.
   * The protective effect was found to be mediated by a combination of humoral and cell-mediated immune responses.
4. **Novel Mechanism of Protection**:
   * Anti-OMVs antibodies generated through immunization significantly inhibited bacterial motility and their ability to penetrate mucin layers.

**Potential Impact**

This bivalent OMV-based vaccine represents a promising candidate for preventing enteric fever caused by *Salmonella Typhi* and *Salmonella Paratyphi A*. By inducing comprehensive immune responses and inhibiting bacterial motility and mucosal penetration, it offers a novel and effective mechanism for protection. If successfully translated to clinical use, this technology could fill a critical gap in enteric fever prevention, particularly in endemic regions.

1. **Need and utility of the Technology from Public health perspective:**

**1. Addressing the Burden of Enteric Fever**

* *Enteric fever*, caused by *Salmonella Typhi* and *Salmonella Paratyphi A*, is a significant public health concern in low- and middle-income countries, particularly in regions with inadequate sanitation and hygiene.
* It leads to substantial morbidity and mortality, with millions of cases reported annually worldwide.
* The emergence of multidrug-resistant (MDR) and extensively drug-resistant (XDR) *Salmonella* strains has made treatment increasingly difficult, highlighting the urgent need for effective preventive measures.

**2. Current Gaps in Vaccine Coverage**

* Existing vaccines, such as the Vi polysaccharide vaccine and Typhoid Conjugate Vaccines (TCVs), primarily target *Salmonella Typhi* and do not offer protection against *Salmonella Paratyphi A*.
* There is no licensed combination vaccine capable of addressing both pathogens simultaneously, leaving populations vulnerable to *Salmonella Paratyphi A*.

**3. Novel Bivalent Vaccine as a Solution**

* The **bivalent OMV-based immunogen** offers protection against both *Salmonella Typhi* and *Salmonella Paratyphi A*, bridging the gap in current vaccine coverage.
* By inducing robust humoral and cell-mediated immunity, it promises comprehensive and long-lasting protection.

**4. Public Health Benefits**

* **Disease Reduction**: Widespread use of this vaccine can significantly reduce the incidence of enteric fever, alleviating the disease burden on affected communities.
* **Antimicrobial Resistance Mitigation**: Preventing infections will reduce reliance on antibiotics, slowing the spread of MDR and XDR *Salmonella* strains.
* **Economic Benefits**: Lower disease incidence will reduce healthcare costs associated with treatment, hospitalizations, and lost productivity.
* **Global Health Equity**: By addressing an unmet need, especially in underprivileged regions, this technology can contribute to achieving health equity goals.

**5. Potential Applications in Public Health**

* Inclusion in national immunization programs in endemic regions.
* Deployment in outbreak settings to contain the spread of both *Salmonella Typhi* and *Salmonella Paratyphi A*.
* Use in travelers’ vaccines to protect populations visiting endemic areas.

**Conclusion**

The bivalent OMV-based vaccine technology is a transformative innovation that addresses critical gaps in enteric fever prevention. Its adoption has the potential to save lives, curb antimicrobial resistance, and strengthen global public health systems.

1. **Technology Readiness level (TRL)**

**TRL – 4/5**

1. **Validation Status and outcome:**

In-house validation was completed by ICMR -NIRBI. Third party validation is pending and to be done under this EoI (Phase I).

1. **IP Filing Status/Publications**

Patent application filed on 25-04-2023 (Application no. 201711011707).

International Application Number: : PCT/IN2018/050158

International Publication Date 04 October 2018 (04.10.2018)

International Publication Number WO 2018/179003 A2

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