



AarogyaAI[®]

Precision Medicine for Anti-Microbial Resistance using Genomics and AI.

Asks:

1. Hospital connects for pilot deployment of Tuberculosis DST software.
2. Raising ₹ 5 Cr, ₹ 2 Cr committed by previous investors.

FOUNDERS



Praapti Jayaswal, PhD
Co-founder & CEO
Molecular & Microbiologist, 13+ years

Avlokita Tiwari, M.S.
Co-founder & CTO
Bioinformatician, 8 + years

ADVISORS



Dr. Soumya Swaminathan
Chief Scientist,
World Health Organization

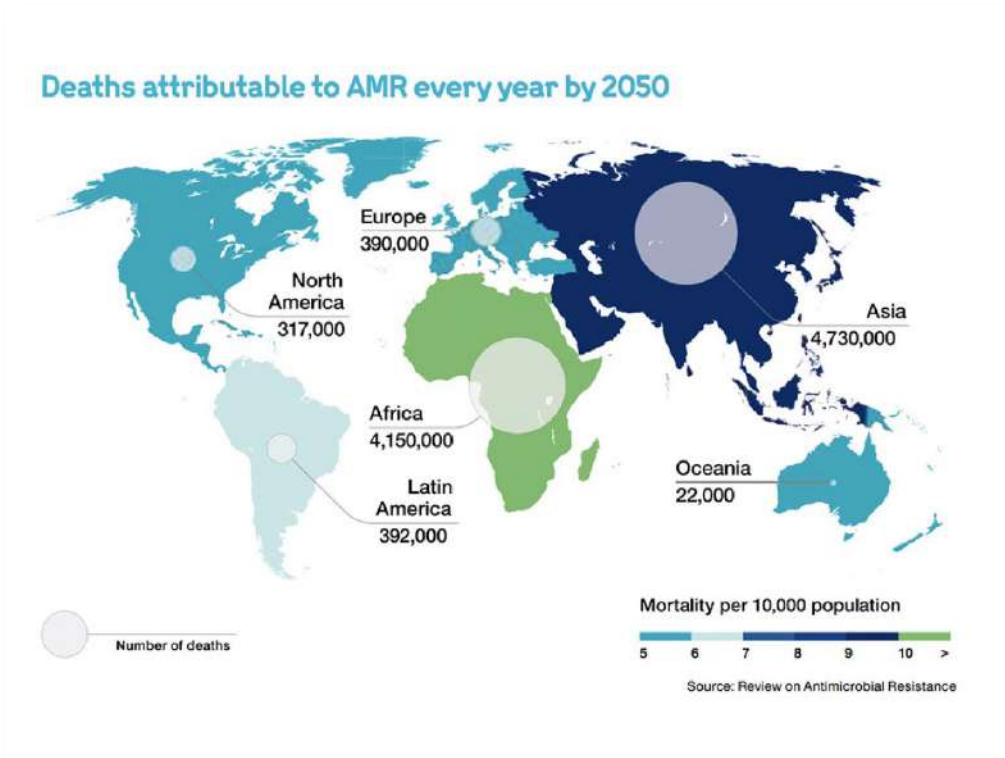


Dr. Nerges Mistry
Director,
Foundation for Medical Research



Private and Confidential

Superbugs will cause the next pandemic



- Antimicrobial resistance is steadily rising.
- **10 Million** deaths annually by 2050 and cost **\$100 Trillion**
- Tuberculosis is the most lethal infectious disease in the world, today (pre-COVID).

O'Neill, J., 2018. Tackling drug-resistant infections globally: Final report and recommendations. 2016. *HM Government and Wellcome Trust: UK.*

India has one third of the global Tuberculosis burden

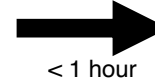


Private and Confidential

- **13 Million** presumptive TB cases in India, today
- **2.7 Million** new TB cases in India, annually
- Drug- resistant TB and its delayed diagnosis exacerbates the problem.
- Govt. of India aims to eliminate TB in India by 2025.



Genomics + Artificial Intelligence = Precision Diagnosis



Extract Bacterial DNA from Specimen

Whole Genome Sequencing

100 X faster

than the existing gold standard for tuberculosis.

Patient ID: MHSP3 Age: 33 Y Gender: F Received: 22/11/2020 02:00:00 PM
 Lab ID: 118872 Referred by: Dr. XXX YY Reported: 24/11/2020 11:00:00 AM

Test Name:
 Anti-tuberculosis drug susceptibility test for first- and second-line antibiotics

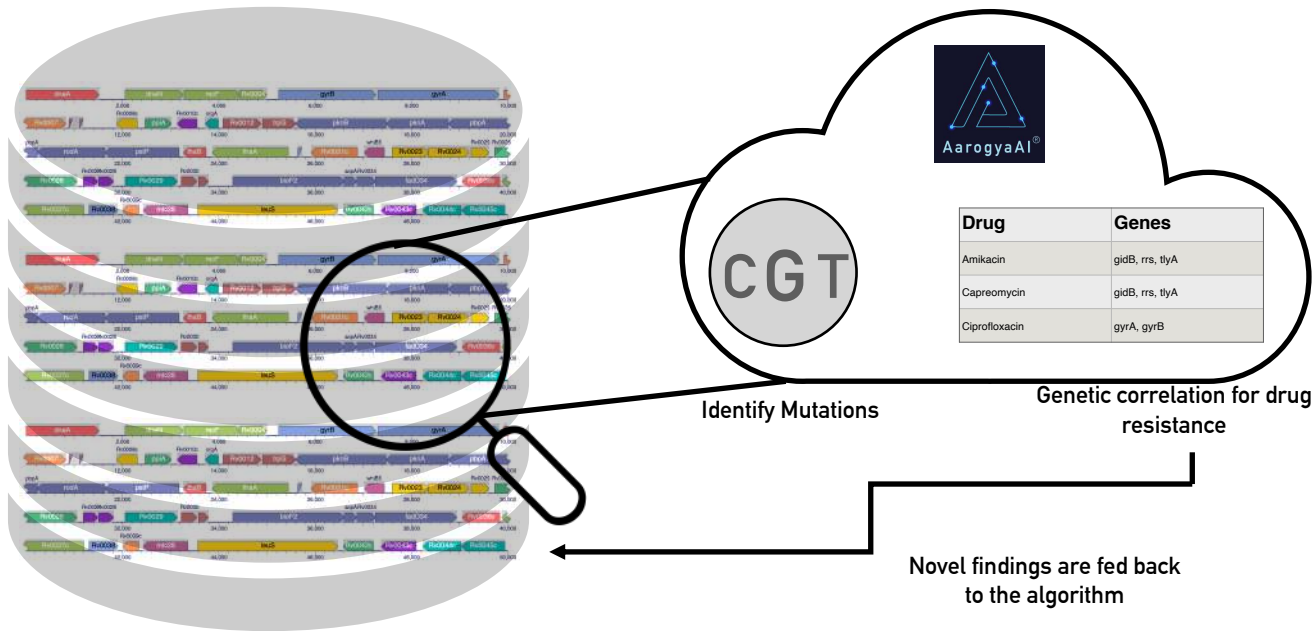
Drug Name	Susceptibility Result
Rifampicin	Resistant
Isoniazid	Susceptible
Ethambutol	Resistant
Kanamycin	Susceptible
Ethionamide	Resistant
Ofloxacin	Resistant
Moxifloxacin	Resistant
Amikacin	Susceptible
Pyrazinamide	Resistant

Analyzed by: AarogyaAI Innovations Private Limited
 Verified by:
 Dr. XXX (Head, microbiology department)
End of Report.....

Comprehensive Drug Susceptibility Report



AarogyaAI® - A Continuous Learning Platform

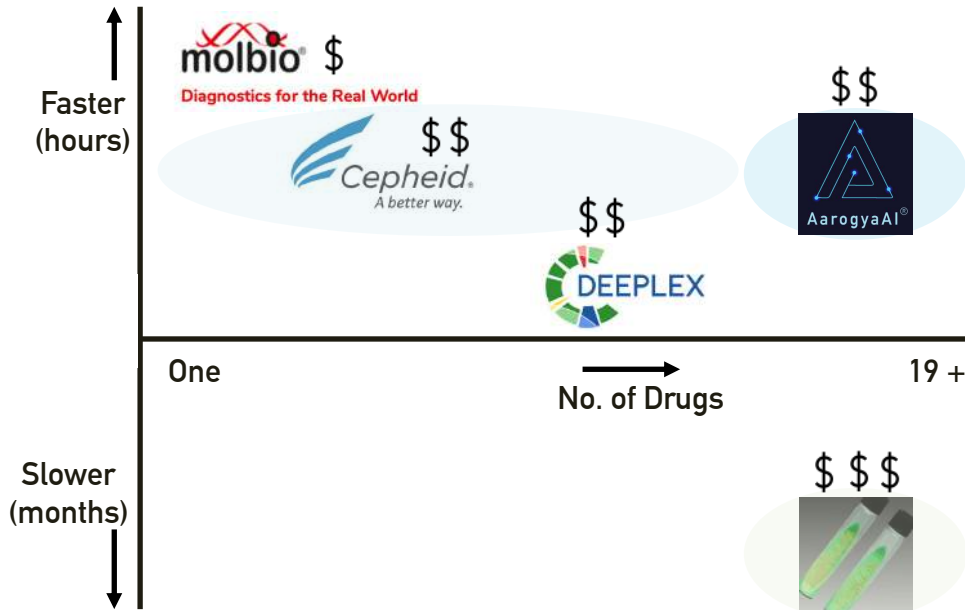


AarogyaAI® Bioinformatics Pipeline

Machine Learning Model

Patent filed. Clinical Validation Underway.

AarogyaAI creates value by rapidly generating a comprehensive drug susceptibility report



Our Key Differentiators:

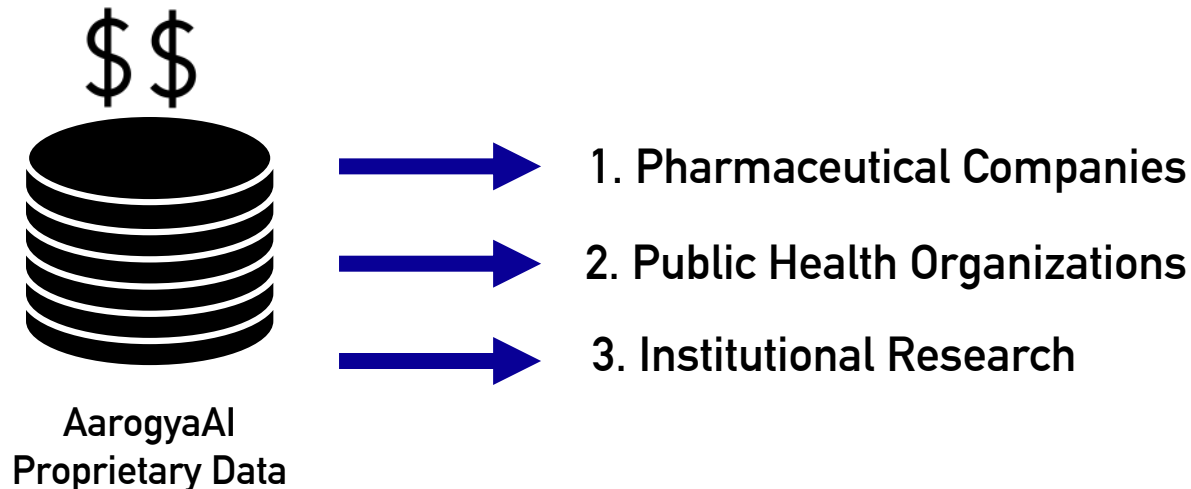
1. Culture-free Approach
2. Whole-genome Sequencing
3. Proprietary Informatics & Database
4. Predictions of Future Drug Resistance Patterns
5. Scalable to other Diseases

Current Solutions: **Rapid** or **Comprehensive**

AarogyaAI- largest database of Indian TB samples in the world

13 million presumptive TB in India

2.7 million new cases of TB in India annually



Achievements

1. Winner of the BIRAC – JanCare Innovation Challenge, 2021 (₹ TBD).
2. Winner of ANIC-ARISE grant from Niti Aayog, Govt. of India, 2021 (₹ 49 lakhs).
3. BIRAC-TiE WinER Award 2020 (₹ 5 lakhs) .
4. Winner - Startup India Western Digital Innovation Bazaar 2020 (₹ 12 lakhs).
5. Finalist - Aayushman Bharat - PMJAY Startup Challenge 2020.
6. NIDHI PRAYAS Grant by DST via Venture Centre, Pune (₹ 10 lakhs).

AI will help to contain infectious bugs before they turn virulent

Indian techies use AI to also help neurosurgeons, oncologists

Shilpa Phadnis & Sujit John | ...

To understand which drug can work on which bacteria or other kinds of bugs, medical researchers have traditionally grown these bugs in laboratories, and applied the drug on the culture to see if it kills them. But it could take weeks to create those cultures.

Praapti Jayaswal and Avitokta 'Twarit' AarogyaAI has adopted a different approach. They extract the DNA of the bug, sequence the DNA, annotate the whole sequence. That helps them figure out different mutations of the same base. They have done this for the tuberculosis bacteria. They have also built algorithms for 14 of the most popular TB drugs, each of which works best on certain kinds of mutations.

Now, when a TB patient comes in, they take a DNA sequence from the patient, and their artificial intelligence (AI) system can quickly identify the particular form of the bacteria, and which drug will work best. Traditionally it is often a trial and error process for the doctor, and arriving at an accurate treatment line could take a long time.

"We are able to identify exactly which drug will work for which patient, and 100 times faster than the existing gold standard (growing lab cultures). By using cutting-edge technology, it takes two months to do lab cultures, and we are able to do it in a few hours," says Jayaswal.

Researchers and entrepreneurs in India are using new age digital

TOWARDS FASTER AND BETTER DIAGNOSIS

Our neuroinformatics platform can give unique insights into brain structure and functions. It can answer questions like, does this person have early forms of dementia, will they move to amnesiac forms of dementia. It can help in better planning for brain tumour surgeries – should you approach the tumour from the right side or the left, with minimal functional loss for the patient.

Lata Emmanuel | CO-FOUNDER & CEO, AAROGYA

AarogyaAI employs genomics and AI to give precision diagnosis and precision medicine for infectious diseases that are manifesting antimicrobial resistance. We are going after tuberculosis first because that's the most lethal disease globally, besides Covid-19 now. We are able to identify exactly which drug will work for which patient, and 100 times faster than the existing gold standard.

Praapti Jayaswal | CO-FOUNDER & CEO, AAROGYA

BrainSight AI

- > Has accelerator agreements with Dassault Systemes, GE-Edition, Netapp. Expected to join Microsoft's Amplify programme
- > Has clinical agreement with Max Hospital, Sabot. In conversation with 4 other hospitals

Investor: Entrepreneur First (pre-seed round). Seed round expected to be completed soon

Illuminia, one of the largest genomics companies in the world, and American angel investors who invest in genomics companies – evidence of the quality of the work being done.

Dinesh Koka's Onward Assist is working with institutions like AIMS Delhi, Tata Memorial Hospital, and Yale Institute of Public

AarogyaAI invests Illumina (one of the largest genomics companies in the world, Entrepreneur First, American angel investors who invest in genomics companies)

> Working with hospitals and National Reference Laboratories with large flow of TB patients



The success rate of cancer treatment is still very poor. A big challenge is, India has only about 400 expert cancer pathologists. We have built AI models structured to mimic the pathology process, look at a cancer biopsy slide, and help pathologists in identifying the areas of interest. It ensures faster diagnosis, and provides advanced clinical information to an oncologist to take a more accurate treatment decision.

Dinesh Koka | CO-FOUNDER & CEO, ONWARD ASSIST

Investor: CIIE (IIMA), Lecterium, SVF Mohan Reddy

Hospital partners: AIMS Delhi, Tata Memorial Hospital, Yale Institute of Public Health

oncologist to take a more accurate treatment decision.

"The reporting time is down by 30-40%. More importantly, you are able to dramatically improve the productivity of the pathologists," he says, adding this is especially important in countries like India where there is a severe shortage of good pathologists.

Lata Emmanuel and Rishabh Agrawal's BrainSightAI is using signal processing, AI, 3D visualisation, and 3D modelling to build a neuroinformatics platform that can give unique insights into brain structural functions. Emmanuel says it can answer questions like, does this person have early forms of dementia, will they move to amnesiac forms of dementia. Does this patient with psychosis have schizophrenia with bipolar, or are there other indicators.

Their AI system looks at long functional MRI videos to figure out "the dance patterns" in the brain – something no radiologist can do. They then take all that information and map it back into the 3D space, so that the doctor can visualise it in the way she understands it best.

Jayaswal says investors have become more open to having discussions with deep tech companies. All three companies have been part of various accelerator programmes, including the GE-Edition one in India. Emmanuel says for market creators like them, working with companies like GE helps to think about problems in a large-scale industrial way.

The platforms they are building in most cases can be applied in a host of other areas. "Bill Gates said the other day that the beauty of antibiotic services is that it is pathogen agnostic. It means, what we are building today can be scaled to other infectious diseases that manifest antimicrobial resistance," Jayaswal says.

Investor: CIIE (IIMA), Lecterium, SVF Mohan Reddy

Hospital partners: AIMS Delhi, Tata Memorial Hospital, Yale Institute of Public Health

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Times of India, 5th May, 2021.



AarogyaAI

Current Status:

1. Product ready for **deployment at pilot site** through BIRAC JanCare Innovation challenge.
 2. AarogyaAI's TB test has preliminary **sensitivity and specificity of 86 – 99 %**.
3. **First 100 TB genomes sequenced** in partnership with strategic investors - Illumina Inc.
4. AarogyaAI's Machine learning algorithm is predicting **novel mutations** that confer drug resistance, IP protection underway
5. AarogyaAI has adapted the pipeline for analyzing **SARS CoV2** genome.



AarogyaAI[®]

Towards a disease-free world

<https://aarogya.ai/>
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