

### My Research Passion- Antimicrobial Resistance

*“The resistant isolates from patients of hetero-resistance nature, which eventually results in treatment failure and creating spread of deadly resistant organisms, can easily be detected as resistant colonies which appear in the zone of inhibition”*

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#### COLUMN ARTICLE

After devoting 40 years of my life to antibiotic research programs of various pharma companies involved in Drug Discovery Research and eventually retiring six years back, I decided to start a new research life. All these years as a research microbiologist, I was very much fascinated by one miracle product, i.e. Etest, used to determine MIC in a single step. It was originally introduced by a Swedish company, AB Biodisk, and had monopoly for almost 20 years and that too in spite of not having patents in most of the countries including India. The reason being that this unique manufacturing process was fully guarded and had no patents based on manufacturing process. Today, there may not be a single clinical microbiologist who has not used or heard about Etest. Presently, Biomerieux is manufacturing and marketing this AB Biodisk product. The other two players are Thermo Fisher Scientific and Liofilchem. Obviously, there is no manufacturing machine available in the world market that one can buy.

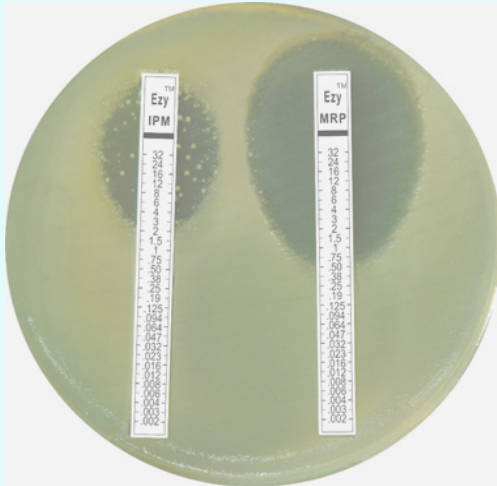
Under such situation, I decided to enter into this difficult but challenging project. Initial success was achieved on lab scale by manual method, eventually resulted into development of my own indigenous manufacturing process. Thus, I became one of the only four coveted companies in the world possessing this unique technology. Of course for this I had to work very hard and that too single handed, right from building of hardware and software of the machine to devel-

opment of compatible antibiotic formulations. My desire was not only to create an equivalent product but one with much superior features.

Today, there are about 120 products of antibacterial and antifungal antibiotics. These are made as per CLSI and EUCAST performance guidelines and provided by Himedia Labs, Mumbai, India as EZY MIC strips. These are normal strips of single antibiotic and others for detection of phenotypic resistance. Moreover, several variants such as dual strips having two antibiotics gradient coated on same paper strip for MRSA detection and other phenotypic strips for MBL, ESBL, AmpC and KPC detection are successfully made. Being a paper strip, unlike that of plastic of others, it adds many advantages such as no pre-drying of plates needed, no underneath air bubbles are formed, no need to press it and since MIC values are printed on both sides, results can be read without opening the plate. Moreover, in this technology, MIC values are not affected by culture inoculum size, even for beta-lactam antibiotics. The pack comes with innovative, self developed and first of its kind sticks for easy transfer of paper strips from container to the plate surface.

Another Important feature is that the resistant isolates from patients of hetero-resistance nature, which eventually results in treatment failure and creating spread of deadly resistant organisms, can easily be detected as resistant colonies which appear in the zone of inhibition. These are not possible to detect by automated short term MIC deter-

mination methods based on optical density. The incorrect susceptibility determination can lead to wrong treatment decision and even mortality. Why and how it happens is my another topic of research. My latest innovation addresses unmet diagnostic need, i.e. phenotypic detection of MBL, ESBL and AmpC beta-lactamases when co-produced in a single clinical isolate by using a pair of EZY MIC strips.



**Figure 1:** Clinical Isolate *E. coli* HM-17: Hetero-resistant for Imipenem  
 Left side: Imipenem EZY MIC strip with resistant colonies in zone of inhibition. Hence, MIC >32 mcg/ml (Not 3.0 mcg/ml as appears)  
 Right side: Meropenem EZY MIC strip. HM-17 is sensitive to MEROPENEM, MIC 0.5 mcg/ml.

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