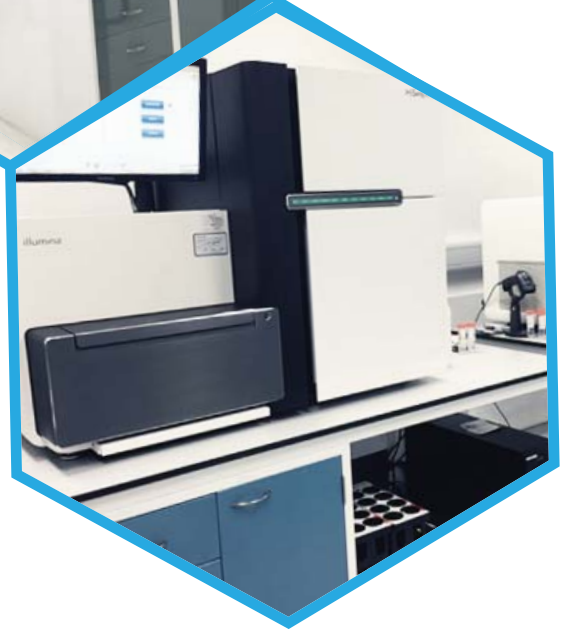
MEDGENOME

Vol 02 | July 2017
www.medgenome.com

GeKNOWme

Internal Quarterly Newsletter



Send us your feedback at : editor@medgenome.com

For internal circulation in MedGenome only

Management speaks

Girish Mehta
CEO (India & Asia)

MedGenome is inching closer to its mission of improving global health by decoding the genetic information contained in an individual's genome. We are getting even more closer to make our vision of leading the molecular biology space in India a reality. I am glad to say that we are the undisputed pioneers in NGS based diagnostic testing in India and we have achieved this within a short period of three years. Now the larger goal is to become the leader in Molecular Biology based diagnostics. We are working towards it by introducing new platforms such as Microarray, FISH and Flow Cytometry, rapidly adding important tests in our portfolio such as Liquid Biopsy, High Resolution HLA Typing, Carrier Screening etc. and aggressively working in the field to create more awareness inside the doctor community of the range and utility of our diagnostic solutions. The entire MedGenome team across functions – Ram and team in operations and new product development, Sanjay and team in business development, Rohit, Ravi and team in Bioinformatics, Chirantan and team in customer support and Surajit, Reena, Anil and their teams in Finance, HR and Marketing - are working with utmost dedication to achieve this goal. Today, we offer over 425 genetic tests across all key disease segments and have a network of more than 400 hospitals for diagnostics and have MOU with more than 10 research collaborations across the country. Knowing the tremendous potential of our portfolio in reducing the burden of disease, we have started offering them in the neighboring countries and happy to state we are getting good traction.

Needless to say that Sam's belief in us and the constant encouragement we get is the driving force to reach this summit. We need to continue this momentum and I solicit your co-operation and participation towards achieving the goals set before us.

Highlights

Most talked about

1

Offering a boon

MedGenome has moved to offer genomics solutions in cancer

Last fortnight, the Bengaluru-based MedGenome, a global genomics firm with presence in the US, India and Singapore announced some major breakthroughs. In a development that could transform the management of cancer patients, it claims to have cracked the difficulties related to tracing malignant cells and avoid repeated biopsies. Doctors are often forced to conduct repeated biopsy tests to detect certain types of cancers related to skin, lung and colon. But, with the new method – liquid biopsy test – developed for the first time in India by MedGenome, physicians can identify genetic alterations, interpret, assess and treat various forms of cancer. The test facilitates detection of mutation where there is difficulty of obtaining biopsy or in the event of a damaged biopsy material and non-availability of tissue biopsy.

This development assumes significance in view of the fact that India has an estimated 1.73 million new cases of cancer and over 880,000 deaths due to the disease by 2020. About 70 per cent

Santhosh: massive transformation

patient's treatment, management, without having to do an invasive biopsy or where biopsy is not an option.

Correct diagnosis

"As the care gets more personalised, doctors will be equipped to make correct diagnosis, prognosis and prediction of diseases. Cell free tumour molecular changes at ba the time of relapse in lu cancer for deciding th ment," says V.L. Ram MedGenome.

The second major ment was the launch of screening test for genetic ited diseases. Over a mill born each year in India disorders and 20-30 per mortality is due to thes is also estimated that t 50 million people in Ind gene disorders.

To help address this p give couples planning t get a better understanc risks of passing on ders, MedGenom rier Screening the NGS tech ages the India genetic variant ated by Ganga over the last 20 cific to Indian pop

Santhosh's test provid mation of 'Carrier' stat and their risks of passing sive diseases (condition w has two copies of an ab to their child. Based on ogy, it tests and can dete recessive diseases and di

2

DIAGNOSTICS

DNA sequencing technology has transformed genomic research globally

BY DR RAM PRASAD

Genomics refers to the study of the genome, which is the complete set of DNA, the blueprint of an organism and includes all its genes. Nucleotide bases, A, C, G and T, in a specific order make up the DNA sequence of an organism. Human genomes include both, protein-coding DNA genes and non-coding DNA. Every piece of genomic information sets the pace for detailed studies of the genome.

Next Generation Sequencing (NGS) is a DNA sequencing technology which has transformed genomic research globally. This potent technology helps in sequencing an entire human genome within a matter of 24 hours. The human genome is made up of more than 3 billion genetic letters and hence sequencing the genome is a pre-requisite to understanding it. However, hi-tech machines are required for all large scale ambitious projects of sequencing genomes. Though a genome sequence helps scientists find genes effortlessly and speedily, scientists are still learning how to recognise, interpret and analyse these clues.

Scientists have progressed from the analysis of a single gene to the investigation of thousands of genes. The science of genomes is dedicated to the determination of DNA sequences. Genes are the building blocks of heredity. They are passed from parent to child. Sometimes there is a nucleotide base change, mutation, in the gene or genes. This mutation in the gene can cause a medical condition called genetic disorder.

Some complex genetic disorders:

Down syndrome or Trisomy 21 is a chromosomal disorder caused because of an error in cell division resulting in an extra copy or a part of the copy of chromosome 21. It is one of the most commonly occurring chromosomal disorders in [illegible]orns, which

1. The science of genomes is dedicated to the determination of DNA sequences.

3

H.E.A.L.T.H..P.U.L.S.E

Genes and cancer therapy

Experts are looking to genetics for diagnosis of cancer

What happens to cancer patients when medicines stop working because their bodies have developed resistance, making the expensive cancer therapy ineffective? Should they give up and wait for the inevitable? Have all the avenues for such patients closed? Drug makers, researchers and oncologists are increasingly looking towards genetics and its applications in diagnosis, studying the genomic sequence of cancer causing genes and coming up with personalised and targeted therapies for cancer patients, as possible answers to such tough questions.

Lung cancer

Take for instance lung cancer patients, who often develop resistance to the ailment and need tissue biopsy to ascertain the spread of cancer. The doctors need to find the reason or the gene that has mutated and causes body to develop resistance to drugs. Once this mutated gene is identified, the doctors can start a fresh protocol for treatment of lung cancer, targeted specifically at the mutation. Lungs are delicate and in general taking a tissue sample for biopsy is complicated and needs an expert hand. Due to exposure to chemo and radiation therapy, it's difficult to convince lung cancer patients for another tissue biopsy.

Liquid biopsies

"Recently, we came up with liquid biopsy, which enables us to identify the mutated cancerous gene only through a simple blood test. Imagine this kind of technique to be used in other cancers. I am definite that we are moving in that direction," says CEO, MedGenome, Girish Mehta.

Normal biopsies are based on the principle of collecting tissues from the cancerous organs and then subjecting it to a series of tests to ascertain the correct cancerous target. Such biopsies, however, are uncomfortable, painful and risky for patients, apart from being expensive. "Liquid biopsies are the future because a sample of blood is enough to look for cancer cells in tumour that are circulating in the blood. Liquid biopsies have the potential to detect for pieces of DNA from the tumour cells in the blood at very early stage of onset of cancers," says Mehta. Thanks to such tests, it is now possible to identify the genomic make-up of tumour through a simple blood test. "Apart from mapping the genome of the tumour, such biopsies enable us to come-up with personalised and targeted treatment for the patients. It has opened up new avenues for diagnostic treatment," he says.

— *M Sai Gopa*

Revolutionary treatment

Cancers that can be targeted through genetics

- Breast
- Colorectal
- Gastrointestinal stromal tumor
- Kidney
- Lung
- Melanoma
- Multiple myeloma
- Some types of leukaemia and lymphoma
- Some types of childhood cancers

Liquid biopsies

- It is a non-invasive blood test that can provide information about the patient's cancer
- Simple blood draw is enough and no need to collect tissue
- Blood samples can be taken repeatedly, compared to tissues
- Liquid biopsies are still under research
- Major challenge is to ensure results are accurate
- Currently, tissue biopsies continue to remain gold standard

1 MedGenome Liquid biopsy story in Business India

2 Authored article by Dr Ram on 'Genomics for Clinicians' in Healthcare Radius

3 Story on Cancer in Telangana Today
https://telanganatoday.com/genes-future-cancer-therapy

5

pioneer HEALTH

Powered by YASHODA SUPERSPECIALITY HOSPITALS

KAUSHAMBI & NEHRU NAGAR, GHAZIABAD, UP

THE PIONEER 11

NEW DELHI | TUESDAY | APRIL 18, 2017

Delhi plus

THE CLOT PLOT

To mark the World Haemophilia Day, PIONEER HEALTH brings you a complete lowdown on the disease which places India as a nation with the second highest number of Haemophilia A cases in the world

Haemophilia refers to a genetic disorder that diminishes the ability of a person's blood to clot. "People suffering from Haemophilia are at risk for excessive bleeding when injured. The disorder can range from mild to moderate to severe (wherein the person may bleed out unless intervention is provided)," says Dr Rangrawal, COO, MedGenome.

There are two forms of Haemophilia

Haemophilia A

Affects one in 5,000 male births and is caused by deficiency of a clotting factor known as Factor VIII (Factor 8)

Haemophilia B

Affects 1 in 20,000 male births and is caused by deficiency of a clotting factor known as Factor IX (Factor 9). Both factors are essential in the formation of blood clots

FIGURATIVELY

GLOBAL ESTIMATES SHOW THAT MORE THAN 400,000 PEOPLE SUFFER FROM HAEMOPHILIA AND THAT UP TO 75% OF THEM RECEIVE INADEQUATE TREATMENT

INDIA HAS THE SECOND HIGHEST NUMBER OF HAEMOPHILIA A CASES IN THE WORLD, WITH AN ESTIMATED PREVALENCE OF MORE THAN 50,000 AFFECTED

CAUSES

Genetic defects play an important role. The gene coding for Factor VIII and IX are present on the X chromosome, making this an X linked trait. In such cases most males with defective gene get Haemophilia.

Women, more often than not, are 'carriers' for the disorder as they have two X chromosomes.

NO CURE

Currently, there is no known cure for Haemophilia, only management options depending on the severity of the disorder.

DETECTION & MANAGEMENT

Genetic testing can determine Haemophilia and also define its severity. These tests (Carrier Screening) reveal whether females are carriers. It can benefit couples with a family history of haemophilia who are planning on having a child.

New-born screening of children helps parents of an affected child to provide treatment early on. Early detection greatly reduces suffering. Leading great strides in diagnostic labs in India offer services for early detection.

Hemophilia is an inherited bleeding disorder in which the blood does not clot properly

Approximately 1 in 10,000 people are born with hemophilia

EAT RIGHT

Vitamin K-rich foods boost platelet function. They play a big role in blood coagulation by helping regulate the enzymes required for blood clot formation

- Foods rich in Vitamin K include leafy greens like lettuce and parsley, okra, soybean and canola oils as well as cruciferous vegetables like broccoli, spinach
- Vitamins K, Calcium, Magnesium, Vitamin C, and Vitamin B complex are all essential for normal blood coagulation, formation and clotting.
- Fencing is also very important for Hemophilia because it is likened to a blood transfusion. Carrots, bean greens and beets juiced have the highest concentration of components to increase hemoglobin and red blood cell count. Also juice dark greens, leafy vegetables (i.e. bok, spinach, parsley, dandelion greens, etc.)

— JULLEN KAUR, Advisor & nutritionist, Just Diet

CHECK LIST

- Regulate portion size
- Avoid snack food
- Be mindful of hidden calories
- Have fruits & vegetables as they maintain intestinal health
- Eat at least half of your grains from whole grain products. (Oats, barley, whole wheat, flaxseed, bran, brown rice)
- Use low-fat dairy sources
- Bake, broil or grill lean meats, poultry and fish
- Avoid heavy gravies, sauces and toppings
- Dried beans are excellent protein
- Increase use of good fats like olive and canola oils

WHAT PATIENTS SHOULD KNOW

- The most common type (80%) is Haemophilia A, where the person does not have enough clotting factor VIII. Haemophilia B (15%), where the person lacks sufficient clotting factor IX. Both types bleed longer than normal.
- Haemophilia can be mild, moderate or severe. A person with severe haemophilia

Blood spontaneously or with minimal trauma up to 1-2 times a week.

- The best way to manage severe haemophilia is regular replacement of deficient factor (VIII or IX).
- It is important for Haemophiliacs to get regular treatment at a haemophilia centre to ensure access to appropriate diagnosis, treatment and care.
- Haemophiliacs should not take aspirin or any type of non-steroidal anti-inflammatory drugs.
- Exercise and sports benefit most Haemophiliacs because they promote muscle growth, which can minimise sprains, bruises, bleeds and joint damage.
- If diagnosed and treated early, children can look forward to a normal life expectancy.
- Help is available at Government treatment centres and strong patient support organisations like Hemophilia Federation of India

Dr Tulsi Sahi, Professor, Department of Hematology, AIIMS, New Delhi

COMPLETE NO-NO

- All processed animal foods like cheese, butter, cream, ice cream, margarine etc.
- Salt, tobacco, caffeine, sodas, coffee, sugar, and refined white flour

6

PHARMABIZ.com

India's most comprehensive pharma portal

Search Here

About us | Contact us | Advertis

Home | Editorial | Services | Interview | Q&A | Chronicle Specials | Pharma Mart | ePharmail | Archives

Home > TopNews

PHARMABIZ.com India's most compherensive pharma portal

Advertise here

Health & Insurance

+ Font Resize -

Clinical presentation, final diagnosis in genetic disorders a challenge for Indian doctors: Dr Sheetal Sharda

Nandita Vijay, Bengaluru

Saturday, June 03, 2017, 08:00 Hrs [IST]

Clinical presentation and final diagnosis in genetic disorders is a challenge for Indian doctors. This makes early detection of this major disorder a leading cause of childhood morbidity and mortality, according to Dr Sheetal Sharda, Clinical Geneticist, Medgenome Labs.

The Prenatal Diagnosis and Preimplantation Diagnostic Techniques Act of India has no clear recommendations on termination of pregnancies on foetuses with birth defects or genetic disorders. Many families opt for termination after 20 weeks because of late diagnosis, but the Medical Termination Act (1971) does not allow termination after 20 weeks of pregnancy. This is a major challenge for medical fraternity. Policy makers should propose ethical and legal guidelines on the same, said Dr. Sharda.

India not only lacks the adequate knowledge about genetic disorders but is also bogged down by a paucity of testing facilities within easy reach limits testing, she added.

Parents access several specialists for diagnosis, prognosis and treatment. There are many genetic tests available but not affordable, said Dr. Sharda in her discussion on challenges in paediatric genetic disorders and prenatal genetic counselling with Pharmabiz.

There are over 15,000 recognized genetic disorders and more new ones being discovered with advancement in genetic sciences. The incidence is estimated to be 2-4 percent of all births. This number rises to 7 percent at one year of age, as some of the genetic diseases may present later. Nearly 5 percent of teenagers and youth under 25 years develop serious disease attributable to a genetic component. It occurs due to genetic mutations or chromosomal abnormalities. Their effects vary in severity, and can present at any age. Some of them present even before birth, she said,

jority of the genetic disorders are still untreatable with only symptomatic management available like for instance Thalassemia. Most patients are

4

MedGenome decodes genetic info to better diagnose diseases

Shilpa.Phadnis@timesgroup.com

Sam Santosh has dabbled in two different worlds of codes – software and genetic — and has had a second successful innings as entrepreneur, something few achieve.

In 1992, he founded California Software (Calsoft), an IT services company, grew its office in Silicon Valley, made acquisitions, and took the firm public and listed it on the BSE in 2002.

MADE IN KARNATAKA

A decade later, he was closely tracking developments related to the Human Genome Project (HGP), a 13-year long research effort to sequence the human genome to understand genetic predispositions to a disease. He noticed how the cost of decoding a human genome was dropping sharply. "It's more dramatic than Moore's law. The $1,000 genome looks near," he says.

The $1,000 genome refers to an era of predictive and personalised medicine during which the cost of fully sequencing an individual's genome is roughly $1,000. In 2007, when the first sequencing service was launched for consumers, the price was $350,000. Today, some say they have breached the $1,000 mark.

'WE WANT TO FIND NEW DRUG CANDIDATES FOR ABNORMALITIES'

MedGenome offers over 400 genetic tests across all key disease

Received $4 million from investors led by Emerge Ventures in 2013, and $20 million from Sequoia Capital in 2015

Has developed a genetic test for inherited diseases in the Indian population

Revenue doubled to $16.5 million in 2016-17

Santosh saw an opportunity in this, and started MedGenome in 2013, a genomics-driven research and diagnostics firm based out of Narayana Health City in Bengaluru. Its lab offers over 400 genetic tests across all key disease areas and has a network of more than 400 hospitals for diagnostics and 10 plus research collaborators across the country.

MedGenome zooms into clinical and phenotypic data, looks at the biochemical characteristics of an organism, and provides insights to clinicians for better diagnosis. It also conducts non-invasive prenatal tests to predict the risk of chromosomal disorders in a foetus. "The trigger was also from research institutes that wanted us to study the Indian population, which is unique. Indian genomic data will provide insights into complex diseases at the genetic level," says Santosh.

MedGenome received $4 million in Series A funding from investors led by Emerge Ventures in 2013, and two years later, got $20 million in funding from Sequoia Capital.

Last year, MedGenome bought the Illumina Hiseq X Ten platform for genome sequencing. It's also part of the non-profit consortium GenomeAsia 100K that plans to sequence 100,000 individuals that includes populations from 12 South Asian countries and at least seven North and East Asian countries.

Santosh's team has examined the challenges of carrying inherited diseases in India and the data showed alarming statistics. Over a million babies are born each year with genetic disorders and 20-30% of infant mortality was found to be due to these disorders. MedGenome came up with the Claria Carrier Screening, a genetic test for inherited diseases in the Indian population. The test provides carrier status to couples and their risks of passing down recessive diseases (condition where a person has two copies of an abnormal gene) to their children. "These days, you get many requests for examining paediatric neurology," Santosh says.

MedGenome employs 340 people, a majority of them based in its lab in Ben[illegible]u. It has offices in the [illegible] lab in Singapore. [illegible] doubled to $16.5 [illegible] 2016-17 and Santo[illegible] company has bro[illegible] "We want to move u[illegible] chain and understa[illegible] some new drug cand[illegible] abnormalities are," h[illegible]

7

THE WEEK · MAY 14, 2017 41

GUEST COLUMN

Look early for Down syndrome

BY DR PRIYA KADAM

Down syndrome is the most common chromosomal problem seen in newborn babies. At least 25,000 babies born every year in India suffer from Down syndrome. Individuals born with Down syndrome have characteristic physical appearance with mild to moderate intellectual impairment. These individuals may be born with disorders of the heart, vision, speech and hearing. They are also prone to developing gastrointestinal disorders, psychological problems and cancer. Though there is no cure for Down syndrome, early prenatal screening and diagnosis help parents to be well aware of their child's condition.

Prenatal tests

There are two types of tests conducted during pregnancy to detect Down syndrome in the foetus—screening tests to assess the risk of Down syndrome and diagnostic tests to confirm the presence or absence of the condition.

Screening modalities

Biochemical serum screening: These help measure the levels of various biochemicals from the mother's blood during pregnancy. These, along with considerations such as maternal and gestational ages, are used to arrive at risk estimates of a woman carrying a baby with Down syndrome.

Non-invasive prenatal screening test: This highly accurate blood test can be conducted from the ninth week of pregnancy. It investigates the DNA from the blood of the pregnant woman to identify various chromosomal problems including Down syndrome in the foetus.

Ultrasonography: An ultrasound during pregnancy is a useful tool for screening of chromosomal abnormalities. A specific test called nuchal translucency is performed between 11 and 14 weeks of pregnancy. It involves certain measurements like the thickness of the baby's neck. Babies affected by Down syndrome usually have increased thickness behind the neck.

Diagnostic tests

Chorionic villus sampling: An expectant woman undergoes this test between the 11th and 13th week of pregnancy. This involves removing very tiny pieces of the developing placenta and analysing them to look for chromosomal anomalies in the baby.

Amniocentesis: This test is conducted after the 15th week of pregnancy. A small amount of amniotic fluid is drawn from inside the womb under ultrasound guidance. This fluid contains babies' cells, which are tested by techniques such as fluorescence in situ hybridisation and karyotyping to study the chromosomes of the baby. The FISH technique results are known within a couple of days and the confirmatory results by karyotyping in about two weeks. Both prenatal diagnostic tests are invasive and carry a minimal risk of miscarriage.

Once the results are available, the parents are counselled about their choices for further management of the pregnancy.

Dr Priya Kadam is programme director, NIPT, MedGenome Claria.

4 **MedGenome story in The Times of India**
http://epaperbeta.timesofindia.com/Article.aspx?eid=31806&articlexml=MADE-IN-KARNATAKA-MedGenome-decodes-genetic-info-to-24052017019061

5 **Industry story on Hemophilia in The Pioneer**
http://www.dailypioneer.com/pioneer-health/the-clot-plot.html

6 **Dr Sheetal talks about genetic disorders in Pharmabiz**
http://www.pharmabiz.com/PrintArticle.aspx?aid=102328&sid=1

7 **Authored article by Dr Priya Kadam on Down syndrome in The Week**
http://www.theweek.in/columns/guest-columns/look-early-for-down-syndrome.html

MedGenome connect

In the first quarter, April to June, we conducted more than 40 CMEs and relationship meetings in 18 cities. These events covered various aspects of Oncology and NIPT to promote our services amongst eminent KOL (Key opinion leaders) and clinicians. The aim was to reach out to 1500 clinicians with special focus to newly launched liquid biopsy and carrier screening test. Dr.Priya Kadam, Dr.Vidya Veldore, Dr.Venkataswamy, Dr.Sheetal Sharda, Dr.Chirantan Bose were the speakers for these CMEs.

MedGenome also for the first time organised a CME in Dubai on 'Emerging Role of Genomics in Medical Diagnostics for Neurology and Oncology', which was attended by over 70 doctors.

Dr.Ravi Gupta, Dr.Amit Chaudhuri and Dr.Arati Khanna-Gupta participated in the 6th World Oral Cancer Congress of the International Academy of Oral Oncology (IAOO) held in Bangalore between May 17 and 20, 2017 where they gave a talk on "Bioinformatics analysis of NGS data from Head and Neck Cancer patients in India", "Emerging roles of NGS in priming Head and Neck cancer treatment with checkpoint inhibitors and cancer vaccines" and "Genetic landscape of Head and Neck cancer in India: comparative analysis of patients from the South and West," respectively.

Dr. Arati also gave a talk for a programme organised by Illumina in Pune on 27th April, 2017 on cancer breakthroughs and another one on OncoGenomics in Kochi on May 7th.

MC Club - Mumbai

Sahyadri Hospital - Pune

Taj Gateway Hotel - Bangalore

Pipal Tree Hotel - Kolkata

Making a difference

A seven-year-old girl who was showing severe fatigue and malaise was referred to a leading Cancer centre in Kolkata. The clinician, after examination, suspected the disease to be Myelodysplastic Syndrome (MDS) (myelo- = bone marrow; dysplastic = abnormality) which is a result of bone marrow failure to produce healthy blood cells.

Although, most of the cases involving MDS are sporadic there are instances where some patients are predisposed to MDS and Acute Myeloid Leukemia(AML).

The pediatric haemato-oncologist further referred the case for advanced genetic testing for a confirmatory prognosis. At MedGenome, a whole exome sequencing (genetic test) was done using next-generation sequencing and a potentially damaging heterozygous mutation (where in one copy of the gene was mutated/had a mutation/variation/change) was identified. Mutation in a particular gene by name *RPL35A* on Chromosome 3 was identified as a cause. This particular gene is responsible for the proliferation and viability of blood cells. The revelation led to pinpoint the exact disease by the doctor and it was concluded to be Diamond-Blackfan Anemia.

In Diamond-Blackfan anemia, the bone marrow fails to generate enough blood cells resulting in shortage of RBCs whose primary role is to carry oxygen to different tissues of the body. Especially, in this particular disease the shortage of RBCs becomes apparent during the first year of life.

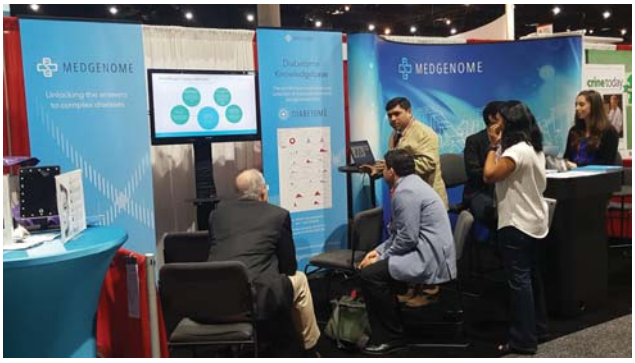
Treatment of such diseases generally involve blood transfusion, bone marrow transplant or medication depending on the severity of the case. The diagnosis helped in her clinical care and today she is on steroid treatment and is now transfusion independent.

There are several cases like above which are solved by genetic testing at MedGenome to help the clinicians either to better manage or treat the diseases and also prevent genetic disease in affected families.

From our US office

MedGenome US office has recently appointed a new Chief Commercial Officer, Mr.Michael Nemzek to strengthen its ongoing efforts in expanding and growing the current US business. In addition to him, there have also been other additions to the existing Salesforce and Operations team. Mr.Michael Nemzek has held executive senior leadership team positions in both public companies and a number of private companies that have become successful public companies by merger and acquisition. He has played a major role in generating significant revenues during his prior tenure at life-science companies including RareCyte, Affymetrix and Velocity11.

The second quarter has been exciting considering the kind of major cancer and diabetes conferences that were attended by the MedGenome team. We were fortunate to grab attention of some of the leading names in the industry. It gives us immense pleasure to state that we are slowly being recognised as one among the major competitors among the many leading names in the US. We attended a major conference in this quarter **the AACR annual meeting 2017** which happens to be the meeting place of elite scientists, research groups and industry fraternity who are doing pioneering discoveries in the space of cancer research and in particular cancer immunotherapy. We also attended other conferences such as **PEGS Summit and the Thirteenth Annual Biomarkers and Immuno-Oncology World Congress, Xconomy's cancer immunotherapy 2017 and the ASCO Conference**. We got an opportunity to present our lead product OncoPept in all of these events, saw a significant response and are happy to say it's growing.



With the launch of **Diabetome** in collaboration with Dr.Mohan's Diabetic Centre it was imperative that we showcase this product at a major event in the US. Fortunately, we got that opportunity in the form of **77th Annual sessions of the American Diabetes Association** - where we setup a booth and exhibited the product along with interactive sessions.
We had some lively discussions with some of the leaders of the major pharma and the scientific community, and are hopeful that the demand for our services addressing diabetes is also going to increase in the coming days. The scientific team was spearheaded by Dr. Srinivasan Vedantham – our disease program lead for diabetes and its associated research projects.

Recently Mr.Hiranjith, Director- Marketing and Corporate affairs successfully organized a symposium on rare diseases. The talk was on "Establishing a Rare Disease Network in India" and the speaker was Dr. Vinodh Narayanan - Medical Director, TGen's Center for Rare Childhood Disorders. We will comeback with many more exciting updates for the next quarter. We thank both the team in India and US who have been significantly contributing to the business initiatives taken by our chairman and global CEO Mr. Sam Santhosh.

Sneak peek into the world of science

Pre-implantation Genetic Screening (PGS) & Pre-Implantation Genetic Diagnosis (PGD)

By Dr. Sam Balu - Senior Scientist

According to market surveys, the Assisted Reproductive Technology (ART) and ***In-Vitro Fertilisation*** (IVF) Market in India is growing at a robust Compound Annual Growth Rate (CAGR) of approximately 18% . This growth rate is driven by the recent rise in infertility rates among Indians due to a variety of reasons. However, according to the same report, this is a highly under-penetrated market; which means, that a large number of infertile couples do not undergo ART/IVF treatments. This is because there is limited success with these procedures. Repeated failure has a heavy financial and emotional toll on the couple. Therefore, any method which can improve the success rate of ART especially IVF pregnancies would significantly alleviate the burden to such couples. Both Pre-implantation Genetic Screening (PGS) and Pre-Implantation Genetic Diagnosis (PGD) can help improve the success rate of IVF as well as reduce the number of cycles required to achieve a successful pregnancy.

The differences between PGS and PGD are given in the table below:

Preimplantation Genetic Screening (PGS)	Preimplantation Genetic Diagnosis (PGD)
A method to screen for Aneuploidies in the Embryo	A method to detect specific genetic defects in the Embryo
Screen for aberrations in all 23 Pairs of Chromosomes (Numerical Changes & Microdeletions>=20 Mb).	Diagnosis of a specific aberration in a Single Gene (Ex. CNV, SNPs Etc.)
Screens commonly occurring abnormalities during IVF (Ex. Trisomies, Monosomies).	Detects specific Single Gene Disorders due to family history (Ex.- Cystic Fibrosis, Hemophilia etc).

Table 1: Differences between PGS and PGD

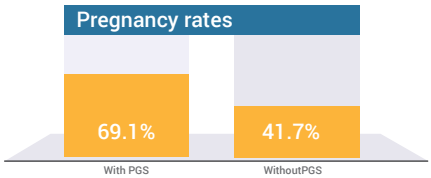


Fig. 1 : Comparison of Pregnancy rates with and without PGS [2].

A study carried out for Indian patients by Majumdar *et al* in 2016 showed that PGS had a higher impact on the pregnancy rate with respect to the Indian scenario.

Both PGS and PGD by virtue of the type of sample being analysed (Human Embryos); are limited to be carried out for *In-Vitro* Fertilised (IVF) pregnancies only. The biopsy can be done on Day 3 (Blastomere, which yields 1-2 cells for analysis) or on Day 5 (from the Trophectoderm which can yield 5-10 cells for analysis). The embryo biopsy itself needs to be done by a skilled and experienced Clinical Embryologist at the IVF centre with suitable infrastructure. This person plays a critical role in determining the quality of the cells being received and ultimately the quality of the results. Using a laser to do the biopsy is the preferred method as it is the quickest method and causes the least amount of cells lysis.

However, we found that a large proportion of the IVF centers across India lacked either or both of these requirements. This meant that we had to stratify the centers based on the technical capacity to provide the lab with quality samples. Those who had the necessary technical expertise and infrastructure, those who lack either and finally those who need to have both setup.

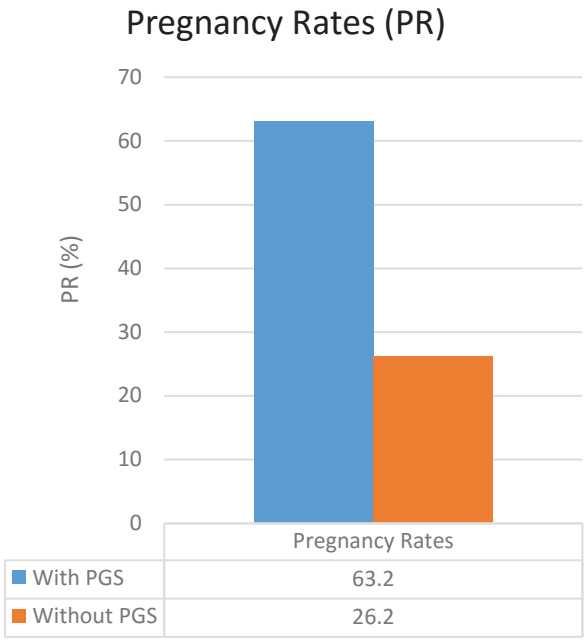


Fig. 2: Comparison of Pregnancy rates with and without PGS in Indian Patients [3].

This led to the realisation that we have to validate these sites using a set of parameters, which met our requirements. There is a need to facilitate centers to develop the skills and infrastructure required. Our viewpoint is that these activities will help us nurture a long - term partnership with the center, while such activities would enable them to provide us a steady flow of samples for analysis.

Next in order to collect, store and transport the biopsy, we had to develop our own Biopsy Collection Kit. This kit has two buffers that are perishable, meaning that kits need to be prepared and dispatched each time based on the customer requirement and not in advance. The kits are prepared and sent to the customer site (at room temperature) on request after the biopsies have been transferred into the collection tubes (0.2 ml tubes). A typical biopsy sample is one to a few cells in 2.5 microliters. The samples once transferred need to be frozen to prevent cell lysis and also loss of samples .The kit then is transported in dry ice to the lab in Bangalore.

Pre-Implantation Genetic Screening (PGS): Once it reaches the lab, a pre-registration evaluation is done to determine whether the samples have been damaged/lost in transit. Once this is completed then the samples are registered and sent for processing. The lab process (WGA, Lib. Prep and Sequencing) as well as the post - sequencing data analysis, interpretation and reporting is done by the PGS/PGD operations team.

Benefits of PGS

- Reduces the number of cycles the patient has to undergo to achieve a successful pregnancy
- Improves the overall success rate of the IVF Centre
- Leads to greater implantation rates and improved IVF outcomes
- Enables single embryo transfers with higher chance of success
- Reduces multiple births and its resulting complications
- Can also provide a "weeding out" of the abnormal embryos
- Reduces the likelihood of miscarriage
- Alleviates the reproductive challenges associated with advanced maternal age

Pre-Implantation Genetic Diagnosis (PGD): The analytical process for Pre-implantation genetics diagnosis (PGD) however, is more complicated. This is because unlike PGS, here we are looking for a specific single-gene disorder that the family is known to be positive for. Therefore, based on the type of variant being analysed the test needs to be chosen or even designed. Custom tests in case of PGD add an additional layer of challenge in the form of test validation. Here the test needs to be validated for detection of the particular variant before the samples can be collected. Keep in mind that all this has to be done considering that patient's IVF cycle is going ahead. Currently, PGD is offered only for Frozen Embryo Transfer, wherein the IVF embryo is vitrified for later implantation. Custom test have variable pricing and Turnaround Time (TAT), which have to be determined on a case-to-case basis.

Benefits of PGD

- PGD can test for most single - gene disorders
- The procedure is performed before implantation thus allowing the couple to decide if they wish to continue with the pregnancy
- The procedure enables couples to pursue biological children who might not have done so otherwise
- It can prevent the same disorder from occurring in future generations by selection of healthy unaffected embryos for implantation

Finally, while reporting the results there needs to be a correlation with other clinical features such as maternal age and obstetric history. Often the patients or clinician need to be counselled regarding the results of PGS/PGD.

MedGenome is gearing up to provide end-to-end support for IVF centres across India, from site validation to results interpretation and genetic counselling. The aim is to improve the overall success rate of IVF pregnancy outcomes and reduce the number of IVF cycles required to achieve a successful pregnancy.

References

1. Ernst and Young (2015). Call for Action: Expanding IVF Treatment in India
2. Fiorentino F, Bono S, Biricik A, Nuccitelli A, Cotroneo E, Cottone G, Kokocinski F, Michel CE, Minasi MG, Greco E. Application of next-generation sequencing technology for comprehensive aneuploidy screening of blastocysts in clinical preimplantation genetic screening cycles. ***Hum Reprod***. 2014 Dec;29(12):2802-13
3. Gaurav Majumdar, Abha Majumdar, Meena Lall, Ishwar C. Verma, and Kailash C. Upadhyaya. Preimplantation genetic screening for all 24 chromosomes by microarray comparative genomic hybridization significantly increases implantation rates and clinical pregnancy rates in patients undergoing *in vitro* fertilization with poor prognosis. ***J Hum Reprod*** Sci. 2016 AprJun; 9(2): 94–100.

For internal circulation in MedGenome only

Diabetome

By Dr. Srinivasan Vedantham - Disease Program Lead - Diabetes

The idea behind launching Diabetome

MedGenome launched its Diabetes solutions product "Diabetome" at the 77th session of the American Diabetes Association, June 9th to 13th, 2017, San Diego. The Diabetome™ Knowledgebase is a unique clinical database that provides data of more than 300,000 subjects with diabetes and tools to enable new insights into diabetes, its risk factors and complications for research and development. Diabetes research today suffers from several challenges due to the fragmentation and complexity of the data. The lack of access to cohorts' large enough to provide sufficient statistical power and heterogeneity hinders the study of disease complications. The chronic and multifactorial nature of complications make the identification and validation of useful therapeutic targets very difficult. The Diabetome Knowledgebase was designed to address these challenges and help researchers looking to develop new therapies. With the knowledgebase, researchers can gain new insights into the biology, and the risk prediction of diabetes. Identification of specific subgroups with unique and important disease profiles (rapid deteriorates, positive therapeutic responders, etc.) enables investigation of subgroups at clinical and molecular levels, and more. Presently, Diabetome supports genetic data for a handful of cohorts and has provision to genotype more cohorts.

The Diabetome team

Diabetome™ is developed in collaboration with Dr. Mohan's Diabetes Specialities Centre (DMDSC), India. I don't think any other centre would have such a huge repository of clinical information on Diabetes patients across years in the world as DMDSC. The idea of representing the big clinical information as a knowledgebase/analytic platform was conceived by Mr. Sam Santhosh (Chairman and Founder, MedGenome Inc.). To design, compile and implement the Diabetome application is a huge task and he thanked team from DMDSC comprising Dr. V. Mohan (President), Dr. Anjana Mohan (Managing Director), Dr. Radha Venkatesan, Ms. Jeba and other internal knowledge opinion leaders for their critics and suggestions during the development of Diabetome. Further a big appreciation to the development, design and marketing communications team of MedGenome comprising Mr. Karthik Kumaramangalam, Mr. Paul George, Mr. Praveen Raj, Dr. Rohit Gupta, Mr. Muthu Narayanan, Mr. Laj, Mr. Somasekhar, Mr. Hiranjith, Mr. Michael Nemzek, Mr. Vinay, Mr. Raghu and others who have been part of the development and launch. Diabetome is now geared for the next phase of development having more enhanced features and tools that helps in understanding the disease transition and outcome measures of various drugs.

For internal circulation in MedGenome only

Overview on Liquid Biopsy

Dr. Vidya Veldore - Principal Scientist - Oncology

Liquid biopsy or plasma cell free tumour DNA testing is a minimally invasive test that provides critical information on prognosis and prediction of response or resistance to any given specific treatment regimen in cancer patients.

Why Liquid Biopsy? and Limitations of tissue-based biopsy techniques

Direct tissue biopsies are limited in utility due to several reasons: technical difficulties in acquiring adequate amounts of tissue, sampling bias that arises due to small area of the tumour being evaluated including inherent morphological and genetic heterogeneity, surgical biopsy procedures may lead to clinical complications in 20% of the cases.

Tissue biopsy at a single tumour site may provide limited information due to heterogeneity of the tumor, while the less invasive techniques, such as a liquid biopsy, has the potential for frequent testing of complete tumor mutational landscape, accounting to multiple tumor sites.

Considering the limitations with tissue biopsy, liquid biopsy testing helps in understanding the dynamics of tumor evolution in the cancer patient, assisting the oncologists in changing the treatment regimen as per the changing mutational pattern and disease burden.

Plasma cell free tumor DNA or ctDNA:

Cancer patients have much higher levels of circulating cfDNA than healthy individuals. As the tumor cells multiply rapidly in comparison with the normal cells, so does the other cellular mechanisms including apoptosis. Most cfDNA fragments measure between 180 and 200 bp, suggesting that apoptosis likely produces the majority of cfDNA in the circulation.

Some of the established liquid biopsy tests are based on Realtime PCR, MassARRAY, droplet digital PCR and Next-Generation Sequencing (NGS) technology.

Key applications of liquid biopsies in the clinical settings are:

- Monitoring treatment response and early detection of relapse
- Tracking minimal residual disease (MRD), and Monitoring clonal evolution

Monitoring Treatment Response and early detection of relapse:

Currently, for treatment monitoring, oncologists typically rely on imaging, such as computed tomography, or CT scan, or PET scan, both of which are costly, time-consuming and associated with minimal risk of radiation. Additionally, disease monitoring typically occurs every 3–6 months.

In contrast to standard biopsy procedures, liquid biopsies can be performed much more frequently with less risk to the patient. The method has the potential to provide a comprehensive genetic signature of the patient's entire tumour burden by providing DNA from more than one site of origin or metastases. Due to the non-invasive nature of the technique, liquid biopsy could be used for frequent monitoring (weekly or bi-weekly) of patients undergoing treatment, to evaluate the patient's response to treatment and, also could be used to detect the development of treatment resistance that may suggest a prompt change in therapy or the acceleration of other clinical diagnostic/treatment modalities.

Liquid biopsy as a surrogate for tissue biopsy:

In certain challenging clinical presentations, performing tissue biopsy may not be a viable option for the patient, in such conditions, liquid biopsy can be an alternative source of tumor genetic material for molecular testing.

Minimal residual disease (MRD) and Clonal Evolution:

Reliable detection and quantification of minimal residual disease (MRD) is effectively employed in the management of patients with hematological malignancies but not in patients with solid tumors. MRD may be one key area of application for liquid biopsies in solid tumors [1-3], in patients who appear to have achieved a complete response to treatment, providing improved monitoring of very low tumour burden, if any during the surveillance period.

For internal circulation in MedGenome only

Liquid biopsy of cfDNA is also being explored to detect the emergence of resistant clones, which limit the remission times achieved in patients treated with targeted therapies, and to correlate findings from cfDNA with patient outcomes. With earlier detection, drug-resistant disease could potentially be addressed by altering therapy, while treatment could be reduced or halted sooner in patients with an early response. In several retrospective studies, treatment-resistant mutations have been detected by liquid biopsy in cfDNA samples taken well before disease progression was evident by imaging [4-5]. In addition to cfDNA, liquid biopsy analysis may also use circulating tumour cells (CTCs) or exosomes or tumor educated platelets as the source for tumour genetic material (DNA, RNA) and proteins for clinical monitoring.

Limitations of Liquid biopsy with cfDNA:

Regardless of its potential applications in cancer treatment management, there are few challenges that we face with liquid biopsy testing. The cell-free DNA content varies between individuals and the amount of cell-free tumor DNA (ctDNA) released into blood stream varies across cancer patients of the same stage of disease. Considering the challenges, it warrants to have extensive experimental and clinical validation of liquid biopsy tests in the laboratory before it could be applied to clinics.

Using Liquid Biopsy to Guide Therapy: Clinical Studies

Plasma cell-free DNA-based EGFR testing has been very well studied in clinical literature and Liquid biopsy has been recommended as a treatment monitoring tool to assess the response to targeted therapy and for early detection of recurrence or disease progression in Non-Small Cell Lung Cancer patients [6] .

Lung Cancer

The activation of ***EGFR*** plays an important role in tumor growth, proliferation and metastasis in several cancers including lung cancer. A missense variation that results in the amino acid substitution at codon 790 (T790M) is a well-documented secondary mutation that is acquired, as a mechanism of resistance to first/second generation TKIs (Gefitnib/Erlotinib). This mutation is present in about 50% of NSCLC patients with acquired resistance to TKIs, at the time of progression. As per the standard clinical guidelines, detection of this mutation recommends change of first and second generation TKI to third generation TKI: Osimertinib (Tagrisso), and it has been demonstrated to have improvement in progression free survival in NSCLC [7-10].

Colorectal Cancer

In colorectal cancer patients, ctDNA based detection of ***KRAS*** and ***APC*** (adenomatous polyposis coli) mutations has been used for the assessment of response to therapy and early detection resistance to targeted therapy (11-13).

Conclusion

Continuous treatment monitoring to measure the efficacy of targeted therapy, evaluation of minimal residual disease and early detection of relapse are some of the important applications of liquid biopsy in oncology. In addition, understanding the genetic heterogeneity in ctDNA of cancer patients, who present with aggressive disease phenotype, may help in stratification of these high-risk patients to more intense therapy.

MEDGENOME'S portfolio on Liquid biopsy

MEDGENOME has launched a series of NGS based liquid biopsy tests in the last couple of months. All these tests are based on NGS profiling of recurrent HOTSPOT mutations in oncogenes.

The scope of these liquid biopsy tests is to assess the status of tumor somatic mutations from liquid biopsy: circulating tumor DNA, from the patient's plasma as the source of tumor genetic material. Liquid biopsy is an investigational / screening test. Unlike traditional biopsy which is an invasive procedure, liquid biopsy is non-invasive as it requires only a peripheral blood drawn from the cancer patient.

This test has several advantages over the traditional treatment management protocols in oncology including – (a) real-time treatment monitoring to evaluate the drug response in cancer patients, (b) early detection of acquired resistance mutations to targeted therapy, (c) detection of

For internal circulation in MedGenome only

recurrence at early stages before significant accumulation of tumor cell mass, (d) identification of tumor heterogeneity arising due to multiple clones and hence the disease progression.

MedGenome's ONCOTRACK test for somatic mutations, is designed to identify hotspot mutations in a panel of four cancer genes ***EGFR, KRAS, NRAS*** and ***BRAF*** that are recurrently mutated in Lung Cancer, Colorectal Cancer and Melanomas, with prognostic and therapeutic relevance.

MedGenome's ONCOSELECT test for somatic mutations, is designed to identify two hotspot mutations T790M and C797S in ***EGFR*** gene. These are secondary mutations in ***EGFR*** kinase domain, arising due to acquired resistance to first and second generation tyrosine kinase inhibitors. It is a highly focused NGS panel with therapeutic relevance in NSCLC management. MedGenome's ONCOFOCUS test for somatic mutations, is designed to identify hotspot mutations in Exons 18, 19, 20 and 21 that spans the tyrosine kinase domain of the ***EGFR*** gene. Screening for ***EGFR*** kinase domain mutations is warranted as part of the diagnostic workup in Non-Small Cell Lung Cancer as per the standard guidelines. It is a highly focused NGS panel with therapeutic relevance in NSCLC management. NGS as a technology has an advantage of detecting rare HOTSPOT mutations at low allele frequency burden, in these exons that could have been missed out by other predetermined assays for mutation detection.

MedGenome's ONCOTRACK ULTIMA test for somatic mutations, is designed to identify hotspot mutations in a panel of 56 cancer related genes, which are recurrently mutated in many solid tumors, with diagnostic, prognostic and therapeutic relevance.

References:

1. Beaver, J.A., Jelovac, D., Balukrishna, S., Cochran, R., Croessmann, S., Zabransky, D., Wong, H.Y., Valda Toro, P., Cidado, J., Blair, B.G., *et al*. (2014). Detection of cancer DNA in plasma of early stage breast cancer patients. *Clin. Cancer Res*. 20, 2643–2650.

2. Diehl F, Schmidt K, Choti MA, Romans K, Goodman S, Li M, Thornton K, Agrawal N, Sokoll L, Szabo SA, et al. (2008). Circulating mutant DNA to assess tumor dynamics. Nat. Med. 14, 985–990.

3. Tie, J., Wang, Y., Tomasetti, C., Li, L., Springer, S., Kinde, I., Silliman, N., Tacey, M., Wong, H.L., Christie, M., *et al.* (2016). Circulating tumor DNA analysis detects minimal residual disease and predicts recurrence in patients with stage II colon cancer. *Sci. Transl. Med*. 8, 346-392.

4. Braig F, Marz M, Schieferdecker A, et al. (2015). Epidermal growth factor receptor mutation mediates cross-resistance to panitumumab and cetuximab in gastrointestinal cancer. *Oncotarget*.6(14):12035-12047.

5. Misale S, Yaeger R, Hobor S, et al. (2012). Emergence of KRAS mutations and acquired resistance to anti-EGFR therapy in colorectal cancer. *Nature*.486(7404):532-536.

6. Sorensen BS, Wu L, Wei W, Tsai J, Weber B, Nexo E, Meldgaard P. Monitoring of epidermal growth factor receptor tyrosine kinase inhibitor-sensitizing and resistance mutations in the plasma DNA of patients with advanced non-small cell lung cancer during treatment with erlotinib. *Cancer*. 2014;120:3896–3901.

7. Yang J, Ramalingam S, Janne P, *et al.* LBA2_PR: Osimertinib (AZD9291) in pre-treated pts with T790M-positive advanced NSCLC: Updated Phase 1 (P1) and pooled Phase 2 (P2) results. *J Thorac Oncol*. 2016;11(suppl 4):S152-153.

8. Goss GD, Yang JCH, Ahn MJ, *et al*. AZD9291 in pre-treated patients with T790M positive advanced non-small cell lung cancer (NSCLC): pooled analysis from two phase II studies. Presented at: The European Cancer Congress; September 2015; Vienna, Austria.

9. Cross DAE, Ashton SE, Ghiorghiu S, et al. AZD9291, an irreversible EGFR TKI, overcomes T790M-mediated resistance to EGFR inhibitors in lung cancer. *Cancer Discov*. 2014; 4:1046-1061.

10. LBA2_PR: Osimertinib (AZD9291) in pre-treated pts with T790M-positive advanced NSCLC: updated Phase 1 (P1) and pooled Phase 2 (P2) results. J. Yang, Taiwan. Thursday 14th April 2016 – 15:45-16:00 New strategies for EGFR addicted NSCLC Room B (ESMO proceedings 2016).

11. Russo, M., Siravegna, G., Blaszkowsky, L.S., Corti, G., Crisafulli, G., Ahronian, L.G., Mussolin, B., Kwak, E.L., Buscarino, M., Lazzari, L., *et al.* (2016). Tumor heterogeneity and lesion-specific response to targeted therapy in colorectal cancer. Cancer Discov. 6, 147–153.

12. Tie, J., Kinde, I., Wang, Y., Wong, H.L., Roebert, J., Christie, M., Tacey, M., Wong, R., Singh, M., Karapetis, C.S., et al. (2015). Circulating tumor DNA as an early marker of therapeutic response in patients with metastatic colorectal cancer. *Ann. Oncol.* 26, 1715–1722.

13. Morelli, M.P., Overman, M.J., Dasari, A., Kazmi, S.M., Mazard, T., Vilar, E., Morris, V.K., Lee, M.S., Herron, D., Eng, C., *et al.* (2015). Characterizing the patterns of clonal selection in circulating tumor DNA from patients with colorectal cancer refractory to anti-EGFR treatment. *Ann. Oncol.* 26, 731–736.

For internal circulation in MedGenome only

Goraj: MedGenome's first Genomic Center

By Dr. Arati Khanna-Gupta, VP, Research & Development

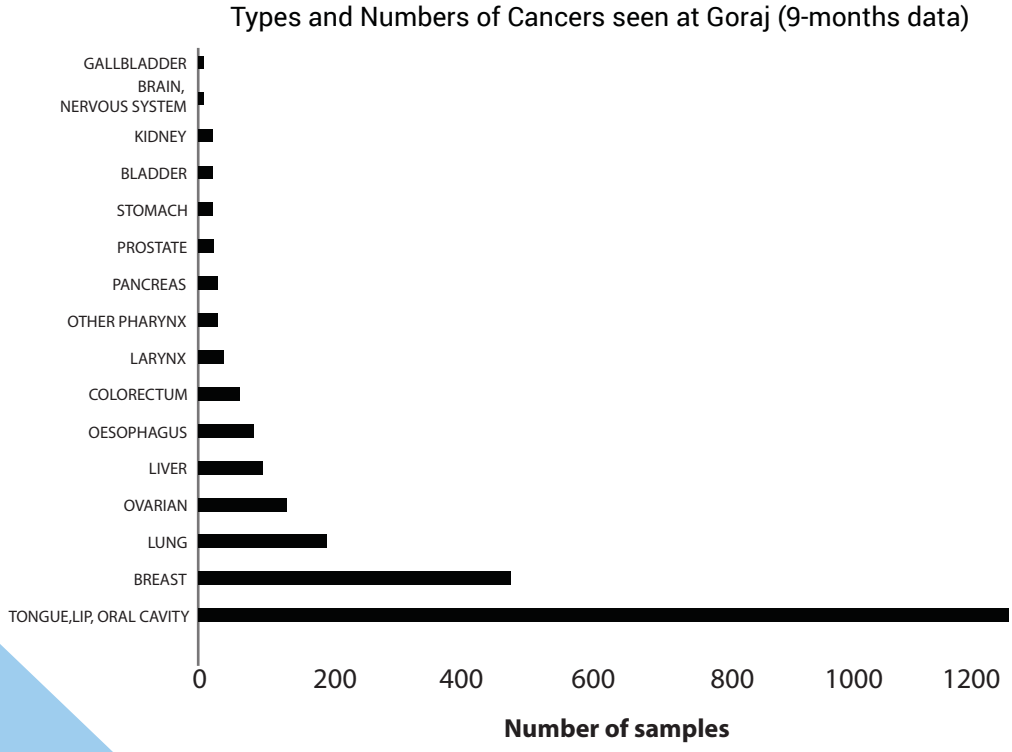
Along the banks of the crocodile infested Dev river in the sleepy village of Goraj near the town of Waghodia in Gujrat, lies the Muni Seva Ashram. It represents a serene and tranquil example of nature and technology coexisting for the benefit of mankind.

Thirty years ago, Anuben Thakkar, a Gandhian and educationist, sought to set up a small dispensary to meet the medical needs of the local farmers. The Ashram today is a modern day marvel where education, health care, alternative energy, social services and agriculture have merged to create a unique entity similar in concept to the Sabarmati Ashram that Mahatma Gandhi instituted before India gained independence.

Today, the Ashram is home to the state-of-the-art Kailash Cancer Hospital and Research Center (KCHRC), the brain child of Dr. Vikram Patel, a pediatrician and Ashram Chairperson, who has dedicated his life to the betterment of humanity. The hospital provides affordable cancer care to patients in this remote tribal belt of Gujarat. The 100-bed hospital serves the rural community as well as the nearby towns.

The MedGenome Genomic Center

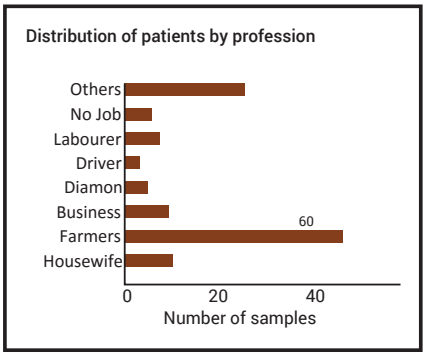
On January 17th 2016, MedGenome Labs established its first Genomic Center at KCHRC with the intent to initiate research studies in collaboration with a rural cancer center, where samples from treatment of naive patients could be tested for disease - related genomic variants using NGS methods. Setting up a laboratory in a rural hospital posed its own challenges, but in a short course of a few months, a functional laboratory capable of processing patient samples was set up.



One of the first tasks for MedGenome Genomic Center personnel at KCHRC was to document the numbers and types of cancers seen by the oncologists. Not surprisingly and in line with data from the National Cancer Registry (ICMR), Head and Neck cancers were by far the most common cancers encountered at KCHRC (see Figure). This is followed by Breast cancers in women. Patients with lung cancers are the third most common cancers encountered at KCHRC. MedGenome has begun research studies in all three cancer types in collaboration with KCHRC and several specific studies are ongoing. Surprisingly, the number of cases of prostate cancers, incidence of which have been steadily increasing in urban India, appear to be rarer in this rural setting. The reasons for this observation warrant further scrutiny.

Head and Neck Cancer studies at KCHRC

Head and Neck Squamous Cell Carcinoma (HNSCC) is the sixth most common malignancy globally, but ranks first in India and at KCHRC because of the extensive use of tobacco, betel-quid and alcohol. Despite the availability of aggressive treatments, The chances of survival for HNSCC patients remains relatively poor. MedGenome has initiated several research studies aimed at gaining a better understanding of HNSCCs and to identify predictive biomarkers that could help in risk stratification, response to treatment and to the development of cancer vaccines using immunobiology approaches.



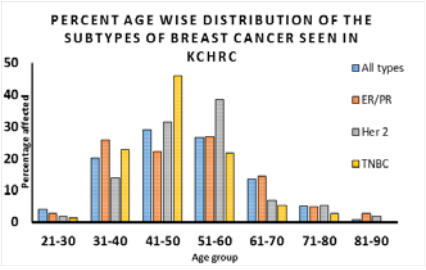
In a recent survey of the Head and Neck Cancer patients at KCHRC, for which detailed clinical and epidemiological data was collected (n=134), we found that three fourths of the patients were male (73% versus 27% female) with an age distribution of 25-80 years. Of these the majority were tobacco chewers (73%) while 30% were smokers. This is not surprising since Goraj is situated adjacent to the tobacco growing belt of Gujrat state which may make tobacco products easily accessible. As expected in this rural setting, the majority of patients were farmers (see Figure to the left).

Preliminary studies of twenty patients suffering from tongue or buccal cancers was performed to understand the genetic landscape of the disease using next generation sequencing methods at MedGenome. Our analyses revealed both commonly occurring genetic variants (e.g. p53) as well as a set of unique Goraj-specific variants. We are in the process of understanding if these variants can be used as targets for vaccine development or as biomarkers for treatment efficacy.

Sample collection for head and neck cancers continues at the MedGenome Genomic Center at KCHRC. These efforts will likely aid in making KCHRC, Goraj one of the leading centers in India for Head and Neck cancer studies.

Breast Cancer at KCHRC

Breast cancer is the second most common cancer encountered at KCHRC, suggesting that women living in rural parts of the country are vulnerable to the disease. Breast cancer is a heterogeneous disease and can be classified based on clinical and pathological features such as, tumor grading, size, lymph node status and vascular involvement. Molecular classification of the disease is made by analyzing the expression of ER+ (estrogen receptor), PR+ (progesterone receptor) and Her2+ (Herceptin 2). By combining the expression with other molecular criteria, such Ki67 staining, four different subtypes of breast cancer are recognized - luminal A, luminal B, Her2 enriched and Triple negative/basal type (TNBC).



A retrospective study conducted by MedGenome at KCHRC, involved 395 breast cancer patients, who were seen at KCHRC from 2008-2010. The age wise distribution of these patients showed a high percentage of disease occurrence in the age group of 41-50 years (see Figure on the left). Among the subtypes, Her 2 positive cancer was more frequent in the age group 51-60 yrs, while TNBC peaked at an earlier age of 41-50 years. Interestingly, a larger cohort of younger patients (less than 40 years) presented with TNBC. Given the aggressiveness of TNBC, and the lack of targeted therapies available to treat this form of breast cancer, MedGenome has begun prospective studies to under-stand the repertoire of mutations which are distinct in this group, which could help in a better understanding of this aggressive form of breast cancer and perhaps in identifying potential candidates for targeted therapy.

Other on-going studies

In the recent past MedGenome has begun studies on Lung cancers at KCHRC. This work involves the use of liquid biopsies for patient follow-up after treatment, rather than putting patients through the pain of re-biopsy. Sample collection for this work is ongoing. In addition, studies on familial and sporadic colorectal cancers are ongoing and have been pivotal in taking the MedGenome cancer vaccine program forward. Studies on Ovarian and Cervical cancers will commence soon after ethical approval for these studies have been obtained.

The Dev river behind KCHRC, Goraj

As the sun sets on the cool waters of Dev river, it is easy to forget that cutting-edge NGS technology which MedGenome brings to the KCHRC table is playing a part in the lives of patients in a rural and distant corner of this vast country. Nearly two years of collaborative efforts between MedGenome and KCHRC have been possible because of trust and camaraderie developed over time. Our hope is to continue collaborative work towards the common goal of a better understanding of cancers for better treatments for all patients.

From our Colleague

MedGenome: Through my eyes

By Dr. E.Venkataswamy, Senior Scientist

MedGenome has grown as a market leader in the genomics space in India within a short span of time. The ambitions are high and we are moving towards making a mark at the global level too. Needless to say MedGenome is now the preferred choice for sequencing based tests among many leading clinicians and prominent Institutions across India and South-East Asia. The success of MedGenome is mainly because of its highly dedicated core group which includes our Chairman Mr. Sam Santosh himself and his elite team of scientists and other scholars.

Our Chairman's vision and mission of making MedGenome a leading Genomics company has finally taken shape, thanks to our senior management team that shares the same passion and drives as our chairman.

MedGenome always strives for exceptional quality work in all aspects and the present status is largely owed to its uncompromising commitment to provide its clients the best possible genome-based services by using the latest technologies available in the world. Our Next Generation Sequencing (NGS) and Bioinformatics team is world-class and the scientific community in MedGenome is growing at a rapid rate. We have several next generation sequencers and in my experience it is the only lab in India to have close to 10 sequencers (Illumina 2500s, 4000s and X10s). But at the same time without neglecting the basic sciences, MedGenome has accommodated Immuno-Histo Chemistry(IHC), Fluorescent in-situ hybridisation (FISH), endpoint PCR, Quantitative (Q)-PCR, Reverse Transcriptase(RT)-PCR and Flowcytometry, Sanger sequencing and other advanced techniques like Microarray and Fluidigm as its genotyping platforms into its core services.

MedGenome offers both diagnostics and research activities under one roof making it a one-stop solution provider. When it comes to diagnosis, there is no comparison to MedGenome in terms of its resources, which has several gene panels covering each and every disease prevalent in human populations which addresses every system in the human machinery. Few products worth mentioning here which have a major impact are OncoMD, NIPT (Non-invasive pre-natal testing), OncoTrack(Liquid biopsy based onco testing), Carrier Screening etc.

MedGenome is the only sophisticated lab in India where young scientists and research fraternity can work and enjoy the science they love so much and who have made it as their career. Equal opportunity and growth is the mantra here. I would go further and say that this is the best place to improve and sharpen one's skill sets. I appeal to all the freshers who have joined us recently to make the best use of this opportunity.

Idea behind the word GeKNOWme

MedGenome HR team recently conducted a campaign "name hunt" for a suitable name for MedGenome's internal newsletter, when I was thinking of a word that can fit our company's trademark and at the same time the newsletter. I actually gave four words viz., DNA Gazette, GeKNOWme, AGCT-NEWS and Genome-Patrika. DNA Gazette is simple with DNA representing the trademark, AGCT-NEWS where A, G, C and T representing the four nucleotides of DNA, and Genome-Patrika with Hindi name for news. But GeKnowMe had some more thoughts added: Since ours is a Genomics company, I selected Genome and was thinking of tweaking this word to hold both the trademark and the newsletter. I replaced the two letters 'no' from Genome with 'Know'. So in this new word Know stands for news (knowing the information happening around us). This is how I figured out the name for our newsletter and it should be pronounced GENOME only, not 'Ge Know Me' and can be written as 'GeKNOWme' or 'Geknowme' or 'GeKNOWme'. Thanks to the selectors for selecting my word as a name for this wonderful newsletter.

Employee connect

Our New-Joiners

Photo feature

Birthday Celebrations

Bangalore Office

Delhi Office

Chennai Office

Kochi Office

Address by Dr. Sandosh Padmanabhan at the Narayana Institute of Cardiac Sciences on 19th April, 2017

Dr.Rohit Gupta, CIO giving away reward to Dr. Venkat for being the Winner of the MedGenome Newsletter 'Name Hunt' contest

Employees, interns and visitors at Foster city office

Employees at Foster city office

World Environment Day Celebration at Kochi Office

For internal circulation in MedGenome only

Special feature: The Making of GeKNOWme

We needed an engine that would run across the organisation, connecting everyone and keeping us up-to-date with important developments within the organisation. This thought was echoed by many employees as well as senior management, and hence our internal newsletter was born.

Of course, that was not going to stop us from making it as attractive as those of many reputed organisations, and that effort is ongoing.

Work was launched on the 6th of Feb 2017. As per our initial plan, the first issue was to cover the financial year 2016-17, followed by quarterly newsletters. However as on the 8th of March, there was a change of plan. We realised it made more sense to just cover the past quarter, rather than an entire year. All this while, the timeline of release remained the same – 3rd of April. We took inputs from many stakeholders on what the structure should look like and what all should it encompass. Sam and Surajit shared a lot of valuable insights here.

Then came the mammoth task of collating content as per the proposed structure.

As a part of the editorial team, we drew inspiration from internal newsletters of companies in the Healthcare, FMCG and IT space. If you ask me what was the toughest part, I'd any day say content collation.

Ramya Krishna

This is where, we'd like to pause and thank every one who contributed to the content for the introductory issue of the newsletter.

The design team went through at least 4 iterations before we finalised on the design that you see. Achieving consensus on such creative work was an achievement in itself.

It was a challenge to pull it all together within the tight deadline provided as it had different sections and a variety of content. We did our best to make it more engaging and dynamic while maintaining simplicity without losing the gist of the overall message.

Raghunathan G

Our newsletter needed a name and that's where the 'Idea Committee' played a role. There was a campaign launched across the company and we had 92 entries. Each of the 'Idea Committee' members distributed their allocated 10 votes across 4 of their top picks. GeKNOWme emerged the winner!

Overall I think the very idea of the contest/name-hunt was cleverly done. In addition to the primary aim of picking a name for the newsletter, it also served as a welcome distraction from the monotony of routine work and made the employees feel involved with the creation of the newsletter.

Jason K D'Silva

For internal circulation in MedGenome only

We needed all the support we could get for proof reading. Some who contributed to this effort must have even felt rushed, at our last minute demands.

First impressions are often last impressions - this is an adage I stick by whenever I write or review any content. GeKNOWme is an excellent initiative taken to provide information and motivation to all MedGenome personnel, and I am happy to have got the chance to be part of the creative process behind this.

Shraddha Easwaran

I wrote a pager on US Office. Indeed, it's a pleasure to be part of the GeKNOWme editorial team and appreciate the efforts of every team member involved here to make it better every time it gets published.

Vinay CG

We were close to the culmination of our efforts and we were nowhere near completion! It was a race against time. Repeated design changes, last minute suggestions, multiple rounds of proof reading, and finally, the communication mail.

Since, we got lots of revisions and comments at the last moment it was really challenging to accommodate those changes within the available timeline. However, as a team we worked hard continuously and delivered it on time.

Hari M Nambiar

It was indeed a pleasure to contribute to the newsletter and I felt happy providing some design inputs to the entire creative process. Overall, the first issue had come out well and of course I feel there is always more room for improvement.

Jagan N

This was when the team burned some midnight oil. We had missed the timeline of 3rd April and a final proof reading led to further changes, which meant one more proofreading! At last we just managed to release the first issue of GeKNOWme, before the clock struck 12 on the night of the 5 of April.

What made all this effort worth the while was the encouraging feedback we received. Some in person and some on mail. A big thanks to all those who joined hands to make our internal newsletter a reality! We request your continued support to make it better and better with each issue.

With Thanks,
The Editorial Team

For internal circulation in MedGenome only

MEDGENOME

A market leader in Genomics-based Diagnostics and Research

One-stop solution for all your Diagnostics and Research needs

Flow Cytometry | Microarray | Sanger | FISH | NGS | PCR | IHC | Fluidigm

NGS: X10 | HiSeq | MiSeq

INDIA

Bangalore
Chennai
Delhi
Kochi

U.S

Foster City

SINGAPORE

Website:
www.medgenome.com