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â??Technology will play a significant role in reducing numbers of new cancer cases and deathsâ?•

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â??Close the care gapsâ?? â?? a bold theme set for 2022-2024 World Cancer Day campaigns that fall on February 4 each year â?? intends to make a huge difference in delivering cancer care to the people.



For 2023, an extended theme ‘Uniting our voices and taking action’ exhorts that meaningful steps must be taken to reduce cancer incidence and make early diagnosis more accessible. Bearing the theme in mind, BioSpectrum India connected with **Raja Sekhar Kommu, Co-Founder and Chief Technology Officer, Karkinos Healthcare**, whose company is leveraging new-age technologies to take evidence-based action in democratising cancer care.

The 2020 International Agency for Research on Cancer (IARC) GLOBOCAN’s cancer statistics reports that there were an estimated 19.3 million new cases of cancer and almost 10 million deaths from cancer. How can intervention by new age technologies make a difference to these numbers?

We have to pay attention to both the numbers here - number of new cases and number of deaths. The reason for such alarming numbers is because of the lack of awareness about cancer, lack of accessibility of cancer care and poor affordability of treatment. In most cases, cancer gets detected in the late stage making it very difficult for oncologists to save lives.

Technology, therefore, has a significant role to play to improve both the numbers. With the help of technology, one can leverage existing distribution networks to increase the awareness about cancer, thereby nudging the population to go for periodic checks for assessing their individual risk for common cancers. In addition, with advances in technologies the diagnosis for cancer is moving from invasive to non-invasive techniques such as liquid biopsy. It is possible to screen and diagnose large populations at a fraction of cost. Both these result in improving the overall new cases and helps move the needle from illness construct to wellness construct.

In addition, with advances in immunotherapy and reducing sequencing costs - it is just a matter of time for molecular testing to become a first line of companion diagnosis, ensuring the right treatment is given the first time to an individual who needs to be treated.

The large amounts of data that gets generated as part of molecular testing, coupled with existing imaging and electronic health records of an individual, can be easily analysed now with machine learning algorithms. This creates the perfect feedback loop back to improve the accuracy of diagnosis and to identify early warning signs of cancer. We are anyway aware of how machine learning helps in the development of new cancer vaccines, cancer immunotherapies and cancer cell therapies.

Karkinos Platform is meant to change the way cancer care is delivered, i.e., made more accessible and affordable. Can you elaborate about its Platform's purpose and the technology involved?

Karkinos platform was developed with the primary purpose as an oncology platform that binds the widely prevalent fragmented cancer care infrastructure in India into an efficient and highly functional network. To accomplish this, Karkinos' 4D model of Detection, Diagnosis, Delivery, and Discovery has been designed.

Karkinos Platform acts like the glue that integrates varied and fragmented treatment touchpoints – creating a Distributed Cancer Care Network (DCCN). The platform can connect an NGO personnel doing a cancer risk assessment at doorstep of a citizen; a trained technician doing a mammogram in a mobile camp unit; a molecular biologist doing genome sequencing in a lab; a physician administering chemotherapy at a day care centre; a medical physicist doing radiation therapy planning; an oncologist prescribing the next step of treatment; an expert participating in a molecular tumour board remotely and most importantly the patient themselves, thus, giving everyone a one single, and relevant view of the information that enables them to effectively do their respective tasks.

Karkinos Platform is conceived to enable interoperability by design, evolve an integration ecosystem, to execute at population scale, to separate data from application and further separate application from user experience, which caters to both clinical and research – ultimately helping to achieve better outcomes for patients and making the journey accessible and affordable. The platform integrates and analyses data from multiple sources, combines data from different modalities and makes it easily accessible and actionable for Karkinos' Care Professionals and Partners.

The platform is designed as a cloud native construct hosted on Google Cloud, leveraging multitude of cloud technologies. The platform primarily uses openEHR, an open data standard to store clinical data in the Clinical Data Repository and uses FHIR for exchanging information with systems outside Karkinos. We strongly believe in Open Source and leverage many open-source tools & products from Cloud Native Computing Foundation. We also intend to make contributions to Open Source in due course. Additionally, the platform is built with security and privacy considerations in mind, as it will be handling sensitive patient data.

Technologies like AI, ML, NLP are all being explored for their applications in oncology - ranging from early diagnosis to advanced cancer research. How, according to you, are these technologies supporting the oncology vertical?

AI, ML, and NLP are all being used in oncology to support various aspects of cancer care, including early diagnosis, treatment planning and advanced cancer research. For instance, Karakinos' Cancer Risk Assessment App is an ML-driven questionnaire chatbot that presents procedurally generated questions as per the respondent's inputs to generate a risk score immediately.

In terms of early diagnosis, AI and ML are being extensively used to analyse imaging data, such as CT and MRI scans, to identify signs of cancer in the early stages. This includes using deep learning algorithms to analyse images and identify patterns that indicate the presence of cancer. Additionally, AI and NLP can be used to analyse patient data from electronic health records, such as lab results and medical history, to identify patients at high risk for cancer and to help triage patients for further evaluation. Karkinos' Oncology specific NLP model OncoKEEN derives structured intelligent longitudinal insights from vast troves of historical treatment data to drive better, faster analysis of the patient care continuum - supporting research and identifying gaps in care.

In terms of treatment planning and cancer research, AI and ML are being used to analyse large amounts of data, such as genomic data and patient outcomes, to:

- Identify the most effective treatments for individual patients. This includes using ML algorithms to predict which patients will respond best to a particular treatment and to identify new drug targets.
- Understand the underlying biology of cancer and to identify new targets for drug development.

Additionally, AI and ML can be used to identify patterns in patient data that may indicate new cancer subtypes or to discover new biomarkers for cancer diagnosis.

On these lines, Karkinos has partnered with prestigious academic institutes in the country such as IIT Madras for the National Centre for Precision Medicine in Cancer and IIT Guwahati for the Centre of Advanced Research on Diagnostics in Cancer (C-CARD) to drive data driven cancer research.

It is the age of preventive and precision medicine. Unless technology is implemented, preventive or precision medicine in cancer care cannot be achieved. How do you support this statement?

Modern cancer care is characterised by three important facets:

1. State-of-the-art clinical medicine, which may include evidence-based and sophisticated therapies targeted to patients' tumour and biological characteristics.
2. An approach to care that is attentive to the spectrum of patients' needs (i.e., physical, psychosocial, functional, spiritual).
3. Use of systems solutions, both human and machine, that support organisations in achieving their clinical medicine and patient-centred care delivery goals.

Optimising these delivery features for a disease as complicated and heterogeneous as cancer often entails complex decision making, multiple handoffs between primary and specialty care providers, and coordination among cancer care team members.

Preventive and precision medicine are both centred around the idea of using individualised information, such as genetic and molecular data, to tailor treatment and prevention strategies to each patient. In order to achieve this, large amounts of data need to be analysed and interpreted. Technologies like AI, ML, and NLP are particularly well-suited for this task, as they can process and analyse large amounts of data quickly and accurately.

How do you see onco-tech evolving in the future?

In the future, technology will play a significant role in the fight against cancer. Some of the areas where technology is likely to evolve and make an impact include:

Early detection: Advances in imaging technology, such as AI-powered imaging and liquid biopsies, can improve the accuracy of early cancer detection. With 5G networks also getting commissioned, the early detection can happen in a point of care device in a screening camp or at the individual's home. This will help to identify cancer at an earlier stage when treatment is more likely to be effective.

Precision medicine: As more data is collected on the genomic and molecular characteristics of cancer, technology will continue to evolve to help make sense of this data and to personalise treatment for each patient.

Cancer research: Technology such as AI and ML will be used to analyse large amounts of data from cancer research to help identify new targets for drug development and to better understand the underlying biology of cancer.

Cancer Immunotherapy: Advancements in fields such as genomics, bioinformatics, and AI, will continue to help in the discovery of new cancer immunotherapies and cancer vaccines.

Cancer Cell Therapies: Advancements in fields such as stem cell biology, genetic engineering, and AI, will continue to help in the discovery of new cancer cell therapies.

Data exchange: Maturity in exchanging multimodal clinico-genomic patient data that is longitudinal and generational will be available for cancer research. This will play a crucial role in AIML cancer projects globally.

All these advancements will certainly help in reducing the cancer incidence and aid cancer research to a large extent.

Anusha Ashwin