Interview

Carlos Caldas

Clinician Scientist and Senior Group Leader, Cancer Research UK Cambridge Institute; Chair of Medicine, University of Cambridge, UK; Honorary Consultant Medical Oncologist, Addenbrooke's Hospital, Cambridge, UK

Citation: EMJ Oncol. 2022;10[1]:xx-xx. DOI/10.33590/emjoncol/10035556. https://doi.org/10.33590/emjoncol/10035556

Q1 What initially sparked your interest in the field of oncology and motivated you to continue researching?

What motivated me, being an internist at heart, was the fact that the molecular biology and genetics revolution would have a first and great impact in cancer medicine. Medical oncology is a specialty for internists who apply molecular understanding of disease to improve the care of patients with cancer. It was obvious to me from very early on that any advances in oncology would come from research into the basic mechanisms of cellular transformation. That egged me on! I wanted to practice as a medical oncologist and to also run a curiosity-driven laboratory research programme to tackle the disease.

Q2 Your research with the Caldas Group focuses on the functional genomics of breast cancer. What was the mission you set out to achieve when this research group was founded?

Our mission was to first characterise in great detail the inter- and intra-tumour heterogeneity of breast cancers. Heterogeneity must be the reason why clinical courses are so diverse! Only with this detailed cancer map can we now move to study tumour dormancy, metastases, and therapy response. We also created patient-relevant models for pre-clinical therapy development. These components will then take us to the ultimate goal: truly personalised precision oncology!

Q3 You also led the Molecular Taxonomy of Breast Cancer International Consortium (METABRIC) study. Could you give us an overview of what this project entailed, and summarise the key findings of the study?

I co-led METABRIC with my colleague and friend Sam Aparicio, and we delivered the genomic and transcriptomic landscapes of 2,000 breast cancers with long clinical follow-up. METABRIC has shown us that breast cancer is a constellation of 11 distinct diseases with very different biology, genomic drivers, and clinical courses. The clinical breast cancer community needs to embrace this knowledge to better manage patients, and clinical investigators need also to account for this when designing clinical trials.

Q4 What changes have you brought into effect since your appointment as Chair of Cancer Medicine at the University of Cambridge?

The creation and development of a multi-disciplinary translational programme that integrates multi-omics, pathology, radiology, and novel clinical trials to deliver systems medicine for the benefit of patients with breast cancer. I also created and led the Cambridge Breast Cancer Research Unit at Addenbrooke's Hospital in 2007, and was its Founding Director until January 2020.

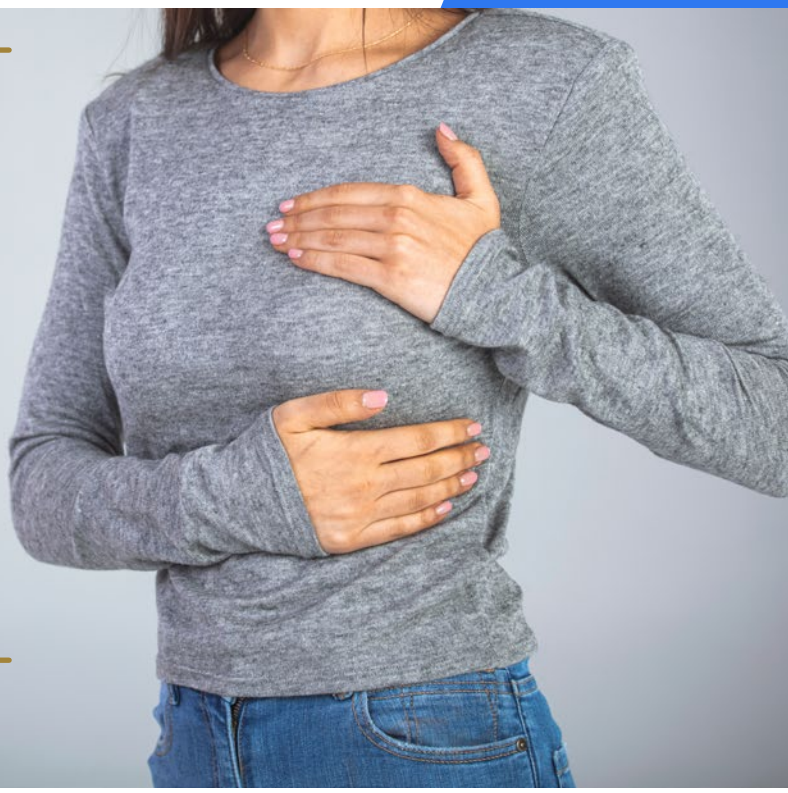
Q5 You until recently led the Cambridge Breast Cancer Programme that you founded in 2016. Has this programme seen much success, and should we expect to see personalised treatment as an option in other forms of cancer?

As I said above, the aims of the translational research programme were to integrate these disciplines to ultimately deliver systems medicine to benefit patients with breast cancer. One of its greatest successes has been the Personalized Breast Cancer Programme (PBCP), which uniquely delivers whole genome and transcriptome sequencing to all consenting patients with both early and advanced forms of the disease in Cambridge. With PBCP, we are empowering National Health Service (NHS) doctors to deliver more targeted and personalised therapies. I am extremely proud that over 850 patients to date have been enrolled in this world-leading and unique programme.

Q6 Over the years practising as an oncologist, how have you seen the field change in terms of advancements to the technology used?

I have witnessed several advances that have had a significant impact on patients, including breast screening, breast conserving surgery and sentinel lymph node assessment, improvements in radiotherapy and hormone therapy, the development of adjuvant chemotherapy, anti-human epidermal growth factor receptor 2 targeted therapy, and genomic medicine.

"It was obvious to me from very early on that any advances in oncology would come from research into the basic mechanisms of cellular transformation."



Q7 There has been interest from many areas of life science and healthcare towards artificial intelligence (AI). Do you believe that there is room for AI in oncology, and will the utilisation of such technologies accelerate research and development?

Both AI and machine learning (ML) will significantly impact oncology in general, and breast cancer medicine in particular. AI has already shown the ability to substantially improve the interpretation and eventual automated reading of screening mammograms. ML was recently shown by my group to be a feasible way to integrate multi-omic data and generate predictors of response to therapy. These examples are just the beginning of what I believe will be a revolution in medicine brought about by big data and its analysis with AI and ML.

Q8 What has been the greatest achievement in your career to date?

I would say two. Firstly, our view of cancers as evolving tumour ecosystems, formed by communities of malignant cells and the many cellular and other components of the tumour microenvironment, constantly being perturbed by therapies and by the immune response. Secondly, another achievement is the role we played in training a new generation of oncologists who understand that tackling cancer requires a detailed characterisation of its molecular underpinnings.