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THE CHALLENGES

OF ADVANCING HOME-GROWN INNOVATION IN BIOTECH

Interview with Dr. Rajini Haraksingh, Lecturer at The University of the West Indies, St. Augustine

How did you get involved in biotechnology research & development in the region?

I was born in Trinidad to academic parents and lived at the doorstep of The UWI. At 19 I moved abroad and studied and worked at top academic institutions at the forefront of Biotechnology.

I saw first-hand how academic research coupled with a robust entrepreneurial technology ecosystem was quickly able to bring solutions from the lab to benefit people. I wanted to bring that experience back to the Caribbean as we should be important contributors to global technological advances, not simply consumers. The Caribbean is brimming with socially driven creativity, most often displayed in our arts and culture. By leveraging this creativity and combining it with cutting-edge technology, we can enable transformative biotechnology development with the promise of addressing our most pressing challenges. So, I moved back home to lead a research

group in human genomics and precision medicine and help develop new Biotechnology programs at The UWI.

How can local advances in biotechnology lead to opportunities for social inclusion?

There are two types of opportunities for social inclusion through (bio)technology. One is working towards equitable access and deployment of existing technologies. The other is creating new technologies to solve challenges by shifting existing paradigms.

At The University of the West Indies, St. Augustine campus in Trinidad and Tobago, we are working towards building capacity in the Caribbean and enabling the development of frontier industries through undergraduate and postgraduate programs as well as research. Our programs, taught by world-class faculty and in world-class facilities, are

designed to produce graduates capable of offering biotechnological solutions to global challenges. Importantly, the tuition costs for regional students are low due to government financial assistance thereby enabling wide access. There is huge student interest in these programs and a high rate of female participation.

Our Biotechnology research initiatives have made significant contributions to epidemic/pandemic molecular diagnostic testing, bioprospecting in our unique environments for novel solutions to the global issue of antibiotic resistance and novel bioremediation agents for addressing environmental challenges, harnessing local natural compounds for novel drugs, and investigating the unique genomes of Caribbean people.

Can you give some examples of socially-inclusive, local biotechnological advances?

One recent example is that most of the PCR COVID testing efforts in T&T were driven by our graduates. They applied their knowledge of PCR to implement testing at global standards. Further pandemic efforts include sequencing the genomes of samples of viruses over time with state-of-the-art technology in Trinidad and Tobago. We also contribute critical data to a larger global initiative tracking the COVID evolution.

My research investigates the relationships between the information encoded in our genomes and our health, our wellness, and our ancestry, which are fundamental to understanding who we are as human beings. There is genetic variation among different ethnic human populations, and this drives variation in disease susceptibility. Therefore, inclusion of diverse human populations is key in human genetic research. Caribbean populations are grossly understudied and are under-represented in biomedical research. We address this through our work. For example, we find very high prevalence rates of diabetes, cancers and heart disease in the Caribbean. These diseases may have unique genetic drivers in our populations. It is beneficial to both our region and our collective

human experience, that there is data representative of our region's unique biology in the scientific sphere.

What is hindering Biotechnology progress in the Caribbean?

Despite our progress, success in research at the highest level is not the norm. Furthermore, the engines for translating scientific advances into products and services are lacking in the region. In my opinion, this is due to inefficient processes for obtaining research approvals, short-sighted use of talent, and most importantly, the fact that currently, a career in research is not financially viable.

The process of obtaining research approvals is often opaque and onerous. This coupled with infrequent regulatory board meetings cause lengthy delays. Advancing the state-of-the-art requires deep consideration and collaboration between researchers and regulatory bodies to chart a way forward while mitigating risks.

Furthermore, foreign researchers are often not subject to the same kind of onerous approval requirements as local researchers, and therefore can access samples and data, and complete studies on local populations more quickly. I believe one unhelpful remnant of colonialism is that we still tend to trust, respect and revert to foreign expertise instead of local expertise.

We have seen a trend at The UWI where administrative and teaching support personnel are cut due to budget constraints. Deep technical research is becoming untenable for Lecturers due to increasingly onerous teaching and administrative duties. These high-salaried experts need time to focus on pushing innovative research agendas to create technology, knowledge and opportunities, which they are uniquely qualified to do. This requires an ecosystem where research is suitably prioritised. Finally, in the Caribbean our post graduate students, collectively constitute the most crucial sector

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of our research community, creating the foundational knowledge that is needed to drive transformational change across our region. This should be their primary focus. However, they are unpaid and often have to engage in other full-time work to earn a living. This prevents their cutting-edge research from advancing at a competitive pace. To minimise this significant issue many universities abroad fund their researchers through stipends. In more mature ecosystems like Silicon Valley, industry is able to support both academic and commercial research. But, we are not there yet.

How do you think these challenges can be overcome?

One example is that we helped develop a national policy for human genetic research that adheres to international standards, to address inefficiencies in research approvals. This policy has not been adopted yet. Importantly, the various regulatory agencies could develop compatible and interchangeable processes to simplify and fast-track research approvals.

There needs to be government investment in research for student trainees to receive liveable stipends. There is a program in place for other industries (GoRTT On the Job Training), but currently, post-graduate researchers cannot access this for their research as they are considered students. I would argue that postgraduate research should fall under the mandate of programs like this, as they are research trainees.

We need both a cultural shift and a shift in how we prioritise our finances for research and development to emerge as a viable and respectable option for many in the region. Furthermore, we need the necessary auxiliary systems in place to ensure that our researchers can devote their time to research while earning a living. We also need transparent and efficient ethics approval policies and practices. Governmental, institutional and policy-level support is critical to advance innovations in the Caribbean.

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Dr. Rajini Haraksingh is a Trinidadian Human Geneticist and Biotechnology Lecturer at The University of the West Indies (UWI), St. Augustine. She leads a research group in human genomics and personalized medicine. Her research focuses on developing and implementing cutting-edge technologies for studying the human genome, and for discovering novel genetic contributors to various human diseases. In particular, Dr. Haraksingh is focused on applying these technologies for improving diagnostics and therapeutics in Caribbean populations plagued by an epidemic of chronic non-communicable diseases. Dr. Haraksingh received two Bachelor's degrees from MIT in Mathematics and Biology, a PhD in Human Genetics from Yale, and postdoctoral training from Stanford in Genomics and Personalized Medicine.

