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Massive strides in the world of small things

How CHRF is redefining single cell-genomics in Bangladesh

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For the first time in Bangladesh, Child Health Research Foundation (CHRF) has successfully generated single-cell genomic (SCG) data for the Human Cell Atlas (HCA). This feat was realised through the support of the Chan Zuckerberg Initiative, which funded the “Global Pediatric Cell Atlas of Nasal and Oral Mucosa” project. CHRF, as a key contributor, has been collecting and analysing nasopharyngeal swab samples from both healthy children and those with infections in rural Bangladesh. The goal of this project is to enrich and diversify the HCA with a paediatric atlas of the nasal and oral mucosa.

The Daily Star took a guided tour through the labs to hear from the scientists themselves to understand the significance of this achievement. Dr Senjuti Saha, the project’s principal investigator, highlighted single-cell genomics as a groundbreaking technology enabling scientists to individually isolate, sequence, and analyse human cells. Unlike bulk genomics, which offers a generalised overview, SCG provides a deeper understanding by discerning the specific types and quantities of cells present in a sample.

Dr Saha then transitioned to a broader issue affecting scientific research globally: the persistent colonial disparity in resource allocation and representation. She explained, “Traditionally, technology and resources have been concentrated in the global North, leaving the most affected populations in the global South underserved. Researchers from the global South have often been relegated to the role of sample collectors, with data analysis and decision-making outsourced elsewhere.” This disparity extends to human genomics, where a predominant focus on samples from North European

descendants hampers our understanding of diversity and ancestry, hindering equitable healthcare solutions.

Despite efforts to address this criticism by shipping samples from the global South, Dr Saha emphasised, “As long as samples are being shipped out, the colonial divide persists. Therefore, this project marks a significant milestone in the history of the Human Cell Atlas, being one of the first designed and executed in the global South. This breakthrough is not only about doing science but also about *where* the science is done.”

The SCG core team then discussed the implications of their work on both the local community and a global scale. Apurba Malaker, senior research officer at CHRF, highlighted how diseases manifest differently in individuals, stressing the importance of understanding cellular specifics for therapeutics and personalised medicine. Deb Purna, a research officer at CHRF, expressed her excitement about contributing to the HCA and ensuring representation of data from Bangladesh. Dr Yogesh Hooda, a scientist at CHRF, expressed optimism about building research infrastructure to facilitate wider adoption of this technology.

Transitioning to the challenges faced during the project, Shakiul Kabir, a research manager at CHRF, discussed the initial hurdles in sample collection and the logistical challenges of transporting samples back to the labs. Dr Saha then elaborated on the difficulties

in acquiring reagents locally, citing exorbitant prices and ethical concerns regarding profit margins. She emphasised that these challenges often take away the headspace that is required for science.

Deb further highlighted equipment issues, noting frequent faults and the lack of repair solutions. Preonath Shuvo, a research officer at CHRF, discussed data generation challenges, including initial sequencing failures and subsequent improvements.

Dr Saha stressed the importance of collaboration in overcoming these obstacles, noting a shift from historical patterns of one-way knowledge transfer. She described their collaboration with Harvard University, Massachusetts Institute of Technology (MIT), and Boston Children’s Hospital as truly equitable, with knowledge exchange and capacity building at its core.

When questioned about their motivation to persevere despite numerous challenges, Dr Saha emphasised the cultural resilience of

Bangladeshis and the real-life impact of their work at CHRF. As the conversation came to a close, the SCG team said, “In addition to our core team, we extend our appreciation to those working in the field at Mirzapur, including nurses, porters, and dedicated community health workers, as well as the supportive mothers of our study participants and all partners who help make global health research truly global!”

