SWADESH, World's First Multimodal Brain Imaging Data and Analytics

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In news—The Department of Biotechnology (DBT)-National Brain Research Centre (DBT-NBRC) have recently developed the project SWADESH.

About SWADESH-

- It is the **first large-scale multimodal neuroimaging database designed specifically for the Indian population with big-data architecture** and analytics for various disease categories under one platform.
- It would strengthen Alzheimer's disease (AD) research and help the scientific community come up with promising treatments.
- It proposes a big-data architecture that manages and analyzes six modules, namely
    - Neurodegenerative [AD, mild cognitive impairment (MCI), and Parkinson's disease (PD)].
    - Neuropsychiatric (schizophrenia and bipolar disorder).
    - Neurodevelopmental (autism and epilepsy).
    - COVID-19-related disorders, other disorders, and healthy subjects.
- **SWADESH is supported by JAVA-based workflow environment and Python.**
- Backed by a dedicated storage system, **it provides quality control, data analysis reports, and data backups.**
- Its development will facilitate the integration of multi-site data and collaborative research worldwide.
- Presently, SWADESH has data of 500 AD and MCI patients and 70 PD patients.

- It also includes data of 600 healthy old individuals and 800 healthy young individuals in the control group.

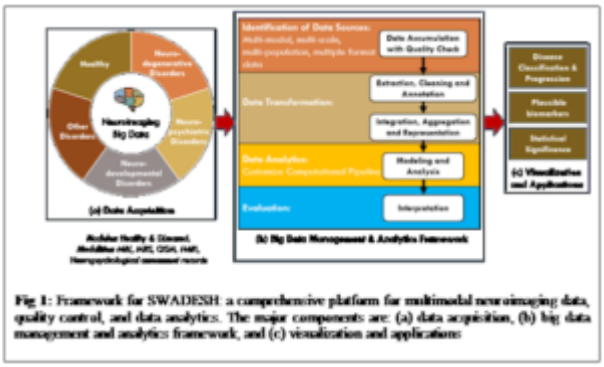

Fig 1: Framework for SWADESH: a comprehensive platform for multimodal neuroimaging data, quality control, and data analytics. The major components are: (a) data acquisition, (b) big data management and analytics framework, and (c) visualization and applications

Clinical research tools-

DBT-NBRC has developed the following clinical research tools through SWADESH:

- **GAURI system uses adaptive pattern recognition and learning schemes for predictive single or differential diagnosis,** designed with MRI modalities and neuropsychological batteries.
- **NINS-STAT is a high-performance state-of-the-art automated statistical test selection** and execution software package with high applicability in clinical research.
- **KALPANA is an integrative package for visualization**, preprocessing, and quantitation of MRS data.
- **PRATEEK analyzes multimodal neuroimaging data that minimizes the need for expertise** in handling different neuroimaging tools for processing and analyzing multimodal data.
- **Stimulus Timing Integrated Module (STIM) includes a versatile paradigm design system**, presentation system, and real-time participant response-collection system for functional MRI-related purposes, mapping brain activity non-invasively in normal healthy condition and clinical evaluation of various brain disorders.
- **BHARAT is a big-data analytic model** for early diagnostic biomarkers of AD. The design included a Hadoop-based

big-data framework integrating MRI, MRS, and neuropsychological test scores.

About National Brain Research Centre(NBRC)-

- It is the **only institute in India dedicated to Neuroscience Research and Education.**
- The Department of Biotechnology (DBT) established NBRC to provide the state of art facilities for a coordinated multi-disciplinary team of scientists to work in the frontier areas of Neurosciences.
- The creation of NBRC was announced on 14th November 1997.
- Now, NBRC is an autonomous institute funded by the DBT and is also a Deemed-to-be University
- NBRC has been recognised as an Institution of Excellence by the Government of India.