

## BIG DATA

### Big data for artificial intelligence applications in laboratory medicine: challenges and opportunities

Dr Andrea Padoan

Department of Medicine, University of Padova, Italy

In recent years, clinical laboratories have experimented a huge improvements in technological tools and instrumentation. Laboratory information systems (LIS) have rapidly evolved from simple software to sophisticated tools able to retrieve and exchange information with several instrumental middleware, other laboratories and the hospital database. Overall, the increase in capabilities of LIS, in addition to recent updates of several technologies, including "-omics" have determined an increase in the flow of laboratory data in clinical laboratories. In addition to demographic details, relevant medical history or diagnosis and test results, other pieces of information are usually documented in the Laboratory Information System (LIS). These additional details mainly encompass the test name, timing of blood withdrawal, any changes made to records tracked through an audit trail, and the technical or medical validations, with the respective wards for inpatients' requests, and general practitioners for outpatients' records. Further, some LIS might include data from the quality system of the lab, not only limited to external and internal quality controls but also as additional resources about the entire process of verification and validation of analytical methods. These data, which present the characteristics of big data, can represent a richness and can be used in the development of several laboratory tools, for improving the entire laboratory testing process. Generated data can be divided in readily available LIS data and "not-readily available" or not recorded. With the first type of data, algorithms for sample mix-up detection, medical validation, patients based real time quality control (PBRTQC), etc. can be generated. With the second type of data, other important algorithms might be developed, such as tools for improving sample transportation, for data aggregation, etc. However, quality of data is essential, as well as data integration. Currently these points represent a real challenge and a barrier for improving the development of AI based tools in laboratory medicine.



Viamonte 1167, 3er Piso / C1053ABW.  
Ciudad Autónoma de Buenos Aires



+54 11 50328220 Int. 241



[www.virtualab.org.ar](http://www.virtualab.org.ar)



[virtualab@fba.org.ar](mailto:virtualab@fba.org.ar)



Avenida 66 N° 1127 / B1900BVK  
La Plata, Prov. de Buenos Aires



+54 221 4452060



[www.fba.org.ar](http://www.fba.org.ar)



[virtualab@fba.org.ar](mailto:virtualab@fba.org.ar)