Advances in Robotics & Automation Technology

Short Commentary

doi: 10.39127/2021/ARAT:1000102
Cardoso M and Potter WD. Ad Robo Auto Tech: ARAT-102

Robotics and Automation in Transfusion Medicine

Marcia Cardoso*, Wim De Potter

Terumo Blood and Cell Technologies Europe N.V.

***Corresponding author:** Marcia Cardoso, Terumo Blood and Cell Technologies Europe N.V. Belgium.

Citation: Cardoso M, Potter WD (2021) Robotics and Automation in Transfusion Medicine. Ad Robo Auto Tech: ARAT-102

Received Date: 31st August, 2021; **Accepted Date:** 02 Sepetmber, 2021; **Published Date:** 07 August, 2021

By now humankind has passed through four different levels of industrial revolution which were based on increased levels of automation, exploitation of new natural resources and advances in electronics with expanded use of computers with increasing capabilities [1,2]. Robotics innovation as well as digitalisation support the broad development and application of artificial intelligence in complex fields including medical science [3].

In transfusion medicine automation started some decades ago in the clinical/ hematology laboratory with instruments with increasing levels of mechanical and optical sophistication supported by software allowing for improved electronic workflow management, data analysis, transfer and storage. Laboratory Information Systems (LIS) or Blood Bank Information Systems (BBIS) ideally manages the flow of electronic information from the instruments through electronic interface compatibility [4, 5].

Modern molecular techniques like the polymerase chain reaction, once a very laborious multi-step technology, is now available at full automated level and allows for detection of multiple pathogens in a single specimen, while its use has expanded to immunohematology with the aim to better identify donor/recipents pairs as well as in the detection of hematological malignancies [6]. Next generation sequencing technologies in blood group typing have achieved high grades of automation, reducing processing time, increasing number of investigating samples per operator and decreasing variability between samples [7,8].

Currently we see in the field of blood processing an increased level of automation targeted at reducing strenuous repetitive steps, streamlining tasks, increasing productivity, reducing waste and human errors [9]. Automation leads to improved consistence of output, which means better standardised blood components [9,10]. The software supportive of this technology not only allows for improved documentation and compliance with regulatory standards, but increases traceability of source i.e. blood donor to final blood components. Besides that, cloud computing enables remote assistance aiming to increase efficiency, decrease costs and avoid unnecessary human reallocation times of restrictive resource utilisation to reverse climate change. Labor resources freed up through the automation of blood processing may be redirected to new developments in the medical field of blood, tissues and organ collection and transplantation, including the very exciting field of cellular therapy.

References

1. Yin Y, Stecke KE, Li D. The evolution of production systes from Industry 2.0 through Industry 4.0. International Journal of Production Research 2018; 56:848-861.
2. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/ Accessed 24.08.2021
3. https://transmitter.ieee.org/how-automation-and-the-fourth-industrial-revolution-is-affecting-your-everyday-life/ Accessed 24.08.2021
4. Dolci A, Giavarina D, Pasqualetti S, Szóke D, Panteghini M. Total laboratory automation: Do tests still matter? Clinical Biochemistry 2017, 50: 605-611.
5. Naugler C, Church DL Automation and artificial intelligence in the clinical laboratory. Critical reviewes in Clinical Laboratory Sciences 2019:98-110.
6. The PCR Revolution, Cambridge University Press, 2011. https://doi.org/10.1017/CBO9780511818974
7. Fürst D, Tsamadou C, Neuchel C, Schrezenmeier H, Mytilineos J, Weinstock C. Next-generation sequencing technologies in blood group typing. Transfusion Medicine and Hemotherapy2020; 47: 4-13.
8. Murphy TW, Hsieh Y-P, Zhu B, Naler LB, Lu C. Microfluidic platform for next-generation sequencing library preparation with low-input samples. Ann Chem 2020; 92:2519-2526.

9. Pérez Aliaga AI, Labata G, Aranda A, Cardoso M, Puente F, Domingo JM, Gracés. Improving of blood processing and safety by automation and pathogen reduction technology. Transfusion Medicine and Hemotherapy, DOI: 10.1159/000516696.

10. Malvaux N, Schumacher A, Defraigne F, Jacob R, Bah A, Cardoso M. Remodelling whole blood processing through automation and pathogen reduction technology at the Luxembourg Red Cross. Transfusion and Apheresis Science, http://doi.org/10.1016/j.transci.2021.103195.