University of Geneva uses fast and reliable software for emergency clinical toxicology identification

After careful research and year long testing, Geneva University Hospitals (HUG) has started using SmileMS small molecule identification software for emergency clinical toxicology screening. For treating patients with toxicological symptoms, doctors need to be able to identify the toxic agent immediately and reliably. So far doctors have used a combination of methods - classical immuno-assays, chemical methods and spectral comparisons of LC-UV-DAD data.

It has been shown that Liquid Chromatography Tandem Mass Spectrometry (LC-MS-MS), together with spectral library searching, is a reliable and efficient diagnostic tool. The team at HUG have developed a method that built on LC-MS-MS in combination with AB SCIEX QTRAP 3200 and Bruker amaZon X instruments – SmileMS.

SmileMS searches product ion scan spectra through the Weinmann library and a Bruker HCT/amaZon library. It offers automated identification with less false alarms, it can screen positive and negative ions at once, and it identify unequivocal compounds in twenty minutes.

The innovative software was developed as part of a collaboration between GeneBio, SIB Swiss Institute of Bioinformatics, and the team of Professor Denis Hochstrasser, Head of the Department of Genetic and Laboratory Medicine at HUG. Hochstrasser says, "There was a strong need for a more robust approach to small molecule identification at toxic and therapeutic levels and with the algorithm developed by GeneBio we have now successfully implemented an efficient solution for routine analysis using LC-MS-MS. Thanks to SmileMS, medical doctors can provide patients with diagnosis or therapy quickly and with high confidence."

1. Swiss Institute of Bioinformatics. HUG choose SmileMS for emergency clinical toxicology screening. Available online: http://www.isb-sib.ch/news-a-events/news-2015/447-hug-choose-smilems-for-emergency-clinical-toxicology-screening.html [Last accessed 26/02/2015].

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Healthcare-developed infections increase death risk for elderly ICU cases by 35%

According to a study at the Columbia University School of Nursing, elderly patients in ICU are 35 percent more likely to die in the next five years after leaving the hospital if they develop an infection during their stay. The odds that these patients will survive the infection and not incur more healthcare expenses will be higher if the most common hospital-acquired infections can be prevented, such as bloodstream infections caused by central lines and ventilator-related pneumonia.

The study was published in the American Journal of Infection Control in January 2015. The researchers analysed the results for 17, 537 elderly Medicare patients admitted to 31 hospitals. The aim of the study was to assess the efficiency of infection prevention efforts. Then, the researchers used 5 years of Medicare data to look into the long-term outcomes and health costs related to healthcare-acquired infections. The results showed that approximately half of the ICU patients died in the next five years, with those who had developed infections during their hospital stay being more likely to die. Around 75 percent of those who developed central line-related bloodstream infections and 77 percent of patients who developed ventilator-caused pneumonia died in the next 5 years.

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The study further showed that effective prevention programs can increase lifespan by 15.55 years for ICU patients. Moreover, results demonstrated that prevention programs can save ICU costs of $174,713 per blood infection patient, and $163,090 for pneumonia developed patients.

1. Columbia University Medical Center. Infections Increase Death Risk by 35 Percent for ICU Patients, Study Finds. Available online: http://newsroom.cumc.columbia.edu/blog/2015/01/06/infections-increase-death-risk-35-icu-patients-study-finds/[Last accessed 25/02/2014].

Effects of blood component therapy on trauma haemorrhage coagulopathy are limited

Haemorrhage continues to be among the main causes of trauma mortality. Damage control resuscitation strategies target trauma-induced coagulopathy (TIC) with the early delivery of high-dose blood components such as fresh frozen plasma (FFP) and platelet transfusions. However, it remains inconclusive if such products are likely to rectify TIC during haemorrhage and resuscitation.

One study, designed to establish the effectiveness of blood component therapy in reducing trauma-induced coagulopathy during hemorrhage, examined bleeding trauma patients at three major trauma centers. A blood sample was drawn immediately on arrival and after 4, 8 and 12 packed red blood cell (PRBC) transfusions. FFP, platelet and cryoprecipitate use was measured for functional coagulation and procoagulant factor levels.

Results showed that on average all functional coagulation parameters and procoagulant factor concentrations declined during haemorrhage. High-dose FFP therapy didn't show clear benefits. However, combined high-dose FFP, cryoprecipitate and platelet therapy with a high total fibrinogen load yielded a consistent improvement in coagulation. Damage control resuscitation with standard doses of blood components does not necessarily correct trauma-induced coagulopathy during haemorrhage. However, there is a possibility that TIC management can be enhanced during damage control resuscitation.

1. Khan S, Davenport R, Raza I, Glasgow S, De'Ath HD, Johansson PI, Curry N, Stanworth S, Gaarder C, Brohi K. Damage control resuscitation using blood component therapy in standard doses has a limited effect on coagulopathy during trauma hemorrhage. *Intensive Care Medicine,* 2015, **41**(2), 239-47.