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RapidTrace®
Automated Solid-Phase Extraction (SPE) System:
Best performer in massive requirements for the doping tests of racing horses

Laboratory of Racing Chemistry (LRC) analyzes samples from racehorses participating in all national horse racing games, hosted by both the Japan Racing Association (JRA) and local government, for doping drugs in order to secure fairness in races as well as the welfare of horses, as stipulated in the Horse Racing Act. In order to screen approximately 1000 samples per week in a speedy and efficient manner, LRC decided to use an array of Biotage RapidTrace automated SPE systems. In an interview, Mr. Kenji Kinoshita, Head, Drug Analysis Section and Mr. Kensaku Shirai, Technical Advisor, Drug Analysis Section, talked about their very interesting experiences with the RapidTrace system in processing the heavy workload.

In the doping test process, RapidTrace system is used to extract samples from the specimens (urine or blood) collected from the horses after the races for further analyses, including gas chromatograph mass spectrometry (GC/MS) or liquid chromatograph tandem mass spectrometry (LC/MS/MS). Their section handles almost 50,000 specimens per year, and receives 200 to 300 specimens for extraction per day.

"Simply put, we want to move quickly"
More than 30 RapidTrace systems are operating in parallel.

"It would be impossible for laboratory staff to manually handle those massive specimens to extract analytes, and we had hoped to reach high automation," Mr. Kinoshita said. "Earlier, we used custom-ordered automated liquid-liquid extraction systems. The systems, however, required a large amount of halogen solvent. To address environmental concerns, we had been planning to switch from the earlier systems to SPE systems, which would require only a small amount of solvent within the closed system."

Indeed, LRC receives a large quantity of specimens every day and the test capacity is critically important. "Rather than a large system, which accommodates many specimens at one time, an array of small-footprint systems would improve the overall throughput, because these would allow a small set of specimens to be subjected to sample preparation as soon as the specimens are received," he said. "The idea led to the parallel configuration of many RapidTrace systems. The individual systems process up to 10 specimens," he said. "The extraction step represents the first half of the test, and we would like to complete that step without taking too much time," said Mr. Shirai. "If you come to the office in the morning and see the measurements of extracted samples set up in the analyzers on the evening before, the workflow will be more efficient."

Mr. Kinoshita said, "Simply put, we want to move quickly. It is the overriding priority, but no system is free from failure. The parallel configuration allows us to transfer the specimens from any failed RapidTrace system to another normally operating one for uninterrupted sample preparation."

"The systems completely meet our laboratory requirements"
- Techniques can be freely switched over without any errors.

RapidTrace process is comprised of three steps; the pre-processing step for conditioning the solid-phase columns, followed by two extraction steps for efficiently obtaining two different fractions from the same specimen. "RapidTrace system allows us to choose different analytical procedures by assigning magnetically-encoded racks containing specimens to one of "Extraction A" and "Extraction B," for example, and to continue the procedure without any human errors. This is RapidTrace's great advantage," said Mr. Kinoshita. "The system exclusively focuses on routine operations, and so the operation is simplified and very user-friendly. It completely meets our needs."

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"There remain improvements to be addressed"

As for the improvements, Mr. Kinoshita said "Advantages always accompany disadvantages as if they were two sides of the same coin. We have, in total, 33 RapidTrace systems and their significant annual maintenance expenses give us headaches. Many RapidTrace systems can be visually appealingly laid out. We like it, but the advantage turns into another disadvantage of making troubleshooting difficult once any one of them fails."

Mr. Kinoshita incited a design problem in relation with RapidTrace system. "The system is designed to receive sample and solvent in the same syringe, which may pose a risk of carryover. A sufficient rinsing process may well eliminate the risk, but we do hope that Biotage will address that improvement," he said.

Any positive findings from LRC drug tests may lead to criminal complaints. The LRC staff have a keen sense of responsibility for the consequences of their job and therefore are sincerely committed to quality assurance of the test findings.

"Currently the best system"

Mr. Kinoshita concluded, "Dope testing is a cat-and-mouse game in a sense. The list of banned drugs will continue to increase. To fight the persistent illicit practice, new detection techniques will be developed one after another. SPE technique, however, will remain the most powerful means to gain ground in that endless race, and we want to pursue more suitable automated systems. Certainly, there are still improvements to be made for RapidTrace, but it is definitively the best system for our business."

Mr. Kenji Kinoshita (right)
Head, Drug Analysis Section

Mr. Kensaku Shirai (left)
Technical Advisor, Drug Analysis Section

Featured system

RapidTrace® automatic SPE system

http://www.biotage.com/DynPage.aspx?id=91936

The system is a modular, automated high throughput solid phase extraction (SPE) platform.
It automatically processes 1, 3 and 6mL standard SPE columns. Up to 10 SPE columns can be set in the individual modules at one time (as for 6mL columns, up to 5 columns). User-friendly software allows you to jointly operate up to 10 modules in parallel. The modular design flexibly provides the best throughput and allows you to process columns using different methods one by one. The design is also beneficial for efficiently developing new processing methods.

Featured company

Laboratory of Racing Chemistry (LRC)

http://www.lrc.or.jp/english/

Laboratory of Racing Chemistry (LRC) was established in 1965 to provide doping tests to develop test techniques. Its organizational status shifted from the earlier "incorporated foundation" to "public interest foundation" on June 1, 2011. Now it works for four areas; drug testing, parentage verification testing, analytical chemistry and research activities. In July 2004, the Drug Analysis Section obtained ISO/IEC 17025 accreditation for testing and calibration laboratories and its quality assurance of testing is officially certified.