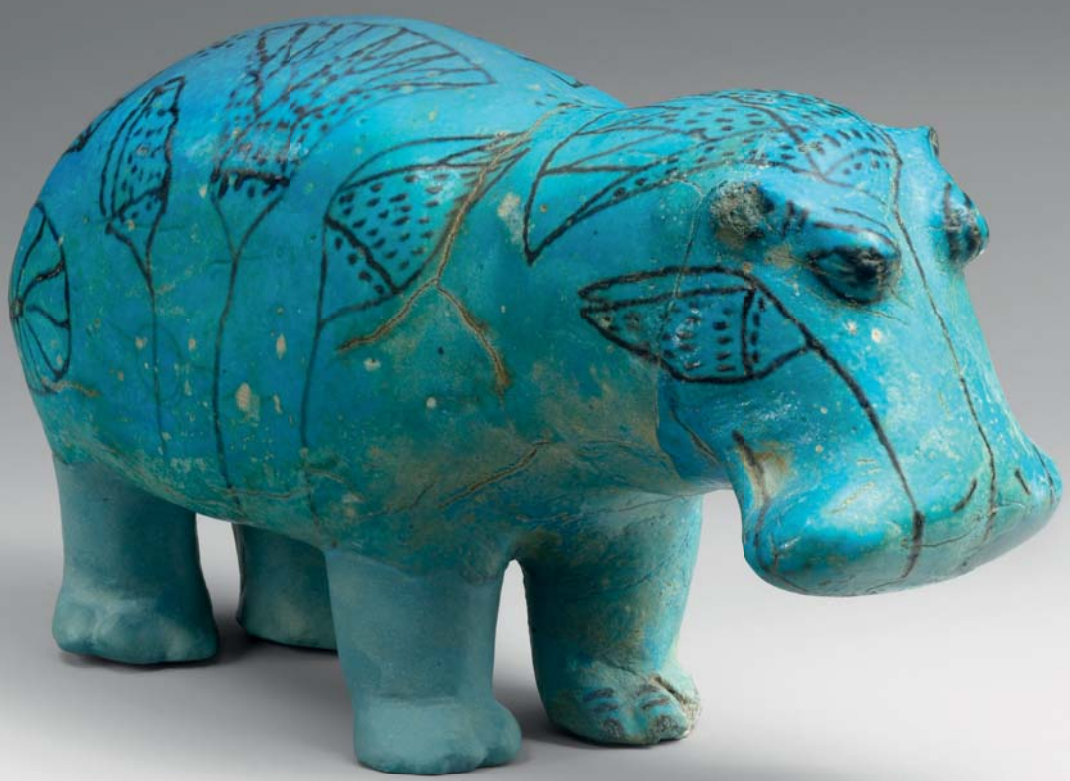
AUGUST 2018 # 67

the Analytical Scientist™

Behind the Scenes at the Museum

A close-up look at the Met's cutting-edge art analysis.



Real-Time Tumor Analysis

Look out! Here comes the SpiderMass

How can we make cancer surgery more efficient? At the moment, there's approximately a half-hour waiting time built into the procedure so that pathologists can inspect the excised tissue to make sure all the cancerous matter has been removed. Now, a research group from France is adding to a growing list of mass spectrometry-driven tools that aim to speed up the process.

"We started by developing a technology to enable in vivo mass spectrometry analysis to target applications for medicine," says Isabelle Fournier, Professor of PRISM Laboratory at Université de Lille. "In our first prototype, we demonstrated that we could perform in vivo analysis with mass spectrometry without being invasive – using the system, SpiderMass, to analyze our skin (1). The technology we developed is based on using the endogenous water of biological tissues as a MALDI matrix." They dubbed the process Water Assisted Laser Desorption Ionization – or WALDI. Initially, the system was used to detect lipids and metabolites – but, in a recent study (2), the researchers expanded their remit, using SpiderMass to detect and analyze peptides and proteins from cancer biopsies in real time.

Fournier says, "The advantages of the technology are to enable easy analysis of various raw samples without any preparation. The samples can be easily screened dynamically by moving the [SpiderMass] handpiece above the surface of the sample." But biopsy tissue isn't the end of the line for SpiderMass. Fournier and her colleagues also hope to analyze peptides and proteins noninvasively in vivo soon.

The team believes that such real-time technologies are a big clinical step for diagnostics and prognostics. With use by pathologists at the bench, in the lab, or directly in a surgical theatre, the process is relatively flexible. Plus, there's room for improved accuracy and further adaptability. Fournier explains, "For diagnostics, the system will rely on the creation of databases of molecular profiles that will be used to build up classification models that can be interrogated in real-time."

A bonus to the technique is the speed at which the team expects it to be clinically ready – less than a year. "We recently moved a prototype to the vet surgery room for testing," says Fournier. "We plan to finish our POC in the next few weeks – although we are currently testing the [in vivo] surgical applicability of the system using lipids and metabolite profiles, but not proteins yet."

References

1. *B Fatou et al., "In vivo real-time mass spectrometry for guided surgery application", Sci Rep, 6 (2016). PMID: 27189490.*
2. *B Fatou et al., "Remote atmospheric pressure infrared matrix-assisted laser desorption-ionization mass spectrometry of proteins", Mol Cell Proteomics, [Epub ahead of print] (2018). PMID: 29653959.*