APPLICATION NOTE 202010

Homogenization of Bat Tissues and Hair with the Bead Ruptor Elite

OMNI International, Inc.

Summary

Bats and bat diseases are the subject of research interest in academia, environmental, pharmaceutical and government research institutes around the world. The species is largely misunderstood, and environmental research highlights that bats are essential animals in biodiverse ecosystems- they pollinate plants, disperse seeds, and control pests. Bat populations are in decline due to human forces such as habitat loss through deforestation and urbanization as well as human introduction of diseases like white nose syndrome. Not only are they an important indicator species of a healthy ecosystem, but they are often studied in medical research since they succumb to human neurodegenerative diseases, including Lou Gehrig's disease (amyotrophic lateral sclerosis, or ALS). ALS disease is induced in individual bats by environmental toxins. Bats have received significant media attention in recent decades since they have been identified as transmission species of viruses such as SARS, MERS, Ebola, and Rabies, among others. Scientists understand that these rare bat-borne zoonoses can be attributed to bats' social nature - bat colonies are among the largest known mammalian social groups- combined with their unique metabolism and immunity [1-3].

OMNI International assists researchers in studying bats in research laboratories. The Bead Ruptor Elite is relied upon for the most basic of needs in the study of environmental, pathology, and pharmaceutical bat research in a wide variety of laboratory settings. This bead mill homogenizer system is used to efficiently homogenize bat tissue samples in sealed sample vessels where zero risk of sample carryover or cross-contamination is required for reliable sample preparation. Homogenized bat tissue samples are typically subjected to further laboratory procedures involved in genetic and metabolomics analyses using techniques like qPCR, LC-MS/MS, and HRMS.

Materials and Methods

Materials

• Bead Ruptor Elite (PN 19-040E)
with
• 7 mL Tube Carriage (PN 19-345-007)
• 7 mL Hard Tissue Homogenizing Mix (7 mL/2.8 mm ceramic bead kit) (PN 19-678)
and
• Optional Bead Ruptor Cryo Cooling Unit (PN 19-8005)

Bead Ruptor Elite

OMNI International
The Homogenizer Company®

Methods

Samples were weighed and transferred to 7 mL Hard Tissue Homogenization Tubes (PN 19-678). Fur was homogenized, without diluent, for 1 cycle of 30 seconds at 6.8 m/s. For samples of bat skin with fur, the samples were processed for 1 cycle without diluent. Then, 3 mL of 0.1 M tricholoroacetic acid was added to the sample tubes. The samples were processed for an additional 3 cycles, 30 seconds, 6.8 m/s, with 45 second dwell times. For skin samples without fur, it is recommended that samples should be weighed into 7 mL Hard Tissue Homogenization tubes with 3 mL aqueous buffer and processed as specified in Table 1.

Sample Type	Method	Diluent & Volume	Bead Kit	Speed (m/s)	Time (sec)	Cycles	Dwell Time (sec)	Comments
Bat fur (25 – 100 mg)	Dry Grinding	None	PN 19-678	6.8	30	1	0	
Bat Skin (without fur) 25 – 100 mg	Wet Grinding 5 mm x 2 mm sections	3 mL aqueous buffer	PN 19-678	6.8	30	3	45	
Bat Skin (with fur) 25 – 100 mg	Wet Grinding 5 mm x 2 mm sections	3 mL aqueous buffer	PN 19-678	6.8	30	4	45	Dry Grind for one cycle, then add diluent and process for an additional 3 cycles

Table 1: Sample Homogenization Summary

Discussion

Figure 1. Image of sample before and after homogenization

The Bead Ruptor Elite homogenized fur, without diluent, in only 30 seconds. When processing samples such as bat skin with fur, it should be noted that fur (or hair) has the tendency to aggregate in the presence of a liquid medium. In order to process the fur with skin, the sample must first be processed dry for one cycle to disrupt the fur to a fine powder. Then, an aqueous diluent should be added to suspend the fur and to homogenize the skin sample matrix. Using this technique, up to 100 mg of skin with fur was processed in less than 5 minutes. Up to 168 fur samples could be processed in one hour.

Dwell (pause) times between cycles can be optimized to suit specific analytical sample preparation requirements. Where thermally labile analytes such as RNA are studied, the Cryo Cooling Unit is recommended to cool the sample chamber to < 10°C.

References

1. Holtcamp, W., "The Emerging Science of BMAA: Do Cyanobacteria Contribute to Neurodegenerative Disease?" Environmental Health Perspectives 120.3 (2012): 110-116.
2. "Bats and Viruses." The Bat Conservation Trust (2020): https://www.bats.org.uk/about-bats/bats-and-disease/bats-and-viruses .
3. "Bat Research Library." Bat Conservation International (2020): http://www.batcon.org/resources/media-education/research-tools

Ordering Information

To Process Similar Samples in Your Laboratory, Contact OMNI today.

• Bead Ruptor Elite (PN 19-040E)

For 10-250 mg samples:

• 7 mL Tube Carriage (PN 19-345-007)

• OMNI 7 mL Hard Tissue Homogenizing Mix (7 mL/2.8 mm ceramic bead kit) (PN 19-678)

Recommended for RNA Analysis:

• Bead Ruptor Cryo Cooling Unit (PN 19-8005)

Contact Info for your OMNI International Representative:

sales@omni-inc.com

or

https://www.omni-inc.com/contacts/

OMNI International

OMNI International Inc.
935 Cobb Place Blvd NW
Kennesaw, GA 30144
United States
770.421.0058 | 800.766.4431