

# CASIS research set for launch aboard SpaceX mission to space station

September 16 2014, by Austin Jordan

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The Advancing Research Knowledge (ARK)-2 mission patch, as developed by COBRA PUMA Golf. Credit: CASIS

The fall marks a new school year, a new football season and another commercial cargo flight to the International Space Station. In September, SpaceX's Dragon spacecraft is scheduled to blast off to the orbital laboratory carrying supplies and investigations as part of the company's fourth contracted mission to the complex.

Included in the cargo will be the third suite of research investigations sponsored by the Center for the Advancement of Science in Space (CASIS). With the role of managing the U.S. National Laboratory on the space station, CASIS is responsible for brokering and facilitating research investigations on the station with clear Earth applications and benefits.

The latest collection of CASIS-sponsored research, termed Advancing Research Knowledge (ARK)-2, centers heavily on life sciences. Studies include those focused on drug development, disease understanding and validation testing. Each investigation will use the unique conditions aboard the space station to advance researchers' understanding in those areas of study.

Additionally, CASIS and NASA have partnered with Techshot Inc., of Greenville, Indiana, to develop a new hardware device capable of assisting with research that may improve understandings of muscle wasting and diseases like osteoporosis.

The CASIS-sponsored hardware and life science investigations destined for the space station's national laboratory include the Bone Densitometer, which will be the first X-ray machine installed on the space station. A joint project between CASIS, NASA and Techshot, the facility will be instrumental in conducting rodent research on station. The Bone Densitometer will allow astronauts to examine bone density of model organisms in space through the use of Dual-Energy X-ray Absorptiometry (DEXA) technology. In short, researchers will be able to

assess [bone density loss](#) by measuring energy levels absorbed by bones via the device.



The Bone Densitometer developed by Techshot, Inc. will enable X-ray testing for research studies aboard the International Space Station. Credit: CASIS

The Rodent Research-1 investigation kicks off a series of NASA and CASIS-sponsored investigations focused on rodent research aboard the space station. The study will be the first to use the Bone Densitometer in an effort to help scientists examine the effects of long duration spaceflight. There are numerous applications to these investigations including studying bone loss, muscle atrophy and cardiovascular anomalies. However, the primary focus of this inaugural mission will be to assess the operational capabilities of the new hardware designed for these investigations.

The Drug Metabolism study will assist researchers in the area of drug development and human biology. This investigation is led by a scientist from the U.S. Department of Veteran Affairs, Dr. Timothy Hammond, who is looking to study yeast cells in microgravity. The goal of this investigation is to explore the changes in these cells in space to improve [drug development](#) for various diseases, including cancer therapeutics.

The Protein Crystal Optimization study is an investigation aiming to leverage the unique location of the space station to examine the internal structure of three medically important proteins. The space environment should allow researchers to grow the selected protein crystals to an optimal size and quality to allow for closer examination via neutron diffraction. This protein crystal growth in microgravity may reveal new characteristics that are masked by gravity on Earth. By studying these three proteins, medically relevant to salmonella infection, peptic ulcer disease, and biomarkers for heart attack and liver disease, researchers can apply insights towards improved treatments.

## **A New Era In Commercial Use of the Space Station**

The space station's national laboratory affords researchers the ability to conduct experiments in a distinctive environment with factors and variables that are near impossible to replicate on the ground. With access to our nation's only orbiting laboratory, CASIS works with new and non-traditional users to take advantage of this resource. A great example of novel commercial research heading to station is the Cobra Puma Golf investigation.

The Cobra Puma Golf-electroplating investigation, also launching aboard SpaceX, is a materials science investigation sponsored by CASIS in collaboration with COBRA PUMA Golf (CPG). The CPG research and development team will examine the impacts of microgravity on electroplating—the process of coating a metallic surface using an

electric current. The study will test a variety of coating substances on materials used in golf equipment manufacturing. The insight gained from this investigation will aid CPG in identifying improved material development techniques.

CPG's project is another example of a commercial user leveraging the capabilities of the ISS National Lab to advance ground research. Through brokering research investigations with commercial companies, CASIS hopes to demonstrate the space station is not only a test-bed for groundbreaking research and development, but a unique laboratory that can help differentiate investigations initiatives from ground-based studies.

The mission is another milestone for the space community, showcasing how commercial endeavors can work hand-in-hand with research goals. The studies of ARK-2 exemplify the diverse possibilities for the [space station](#) and users of the research platform. From commercial launch providers that transport investigations to space, to commercial researchers looking to use the national laboratory, science in space is good for life on Earth.

Provided by NASA

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