

## Accelerator Mass Spectrometry: Extreme Sensitivity in Biological Research

### THE LLNL TECHNOLOGY

Accelerator mass spectrometry (AMS), a technique for measuring isotope ratios with high selectivity, sensitivity, and precision. AMS is the technology used to carbon-date the age of bones and historical artifacts such as the Shroud of Turin, and is making important contributions to biological research. AMS is the platform of choice when extreme sensitivity is required for early-stage drug development. AMS quantifies the amount of radiocarbon-labeled compound in a biological sample with attomole (10<sup>-18</sup>) sensitivity. AMS is so sensitive that it is only used for isotopes having concentrations of parts per billion to parts per quintillion in the isolated elemental sample. Recently, AMS instruments have been developed to quantify long-lived radioisotopes that are particularly suitable for pharmaceutical research, particularly carbon-14 at natural concentrations independently of their decay properties 1,2,3. LLNL has patents that cover the biomedical use of AMS.

### COMPANY

LLNL has licensed this technology to three companies.

### PRODUCT

These companies offer specialty services applying AMS to a variety of biomedical analyses and research applications. AMS applications are expanding, and there is a growing demand for the precision it offers.

### IMPACT

Over the last ten years, AMS has evolved as a biomedical tool, offering the required sensitivity, selectivity, and precision to address questions that alternative methodologies have been unable to achieve in practice. AMS was originally applied in the life sciences to overcome limitations in detection sensitivity for studying the molecular damage caused by exposure to low levels of environmental carcinogens and pollutants. For example, AMS can be used to conduct metabolite analysis at the picomole to attomole level. It is also being used to identify macromolecular targets for drugs and toxic compounds. The high sensitivity of AMS allows analysis into important issues in nutrition, pharmacology, and comparative medicine.