

The NASA Ames Research Center Institutional Scientific Collection: History, Best Practices and Scientific Opportunities

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The NASA Ames Life Sciences Institutional Scientific Collection (ISC), which is composed of the Ames Life Sciences Data Archive (ALSDA) and the Biospecimen Storage Facility (BSF), is managed by the Space Biosciences Division and has been operational since 1993. The ALSDA is responsible for archiving information and animal biospecimens collected from life science spaceflight experiments and matching ground control experiments. Both fixed and frozen spaceflight and ground tissues are stored in the BSF within the ISC. The ALSDA also manages a Biospecimen Sharing Program, performs curation and long-term storage operations, and makes biospecimens available to the scientific community for research purposes via the Life Science Data Archive public website (<https://lsda.jsc.nasa.gov>).

As part of our best practices, a viability testing plan has been developed for the ISC, which will assess the quality of archived samples. We expect that results from the viability testing will catalyze sample use, enable broader science community interest, and improve operational efficiency of the ISC. The current viability test plan focuses on generating disposition recommendations and is based on using ribonucleic acid (RNA) integrity number (RIN) scores as a criteria for measurement of biospecimen viability for downstream functional analysis. The plan includes (1) sorting and identification of candidate samples, (2) conducting a statistically-based power analysis to generate representative cohorts from the population of stored biospecimens, (3) completion of RIN analysis on select samples, and (4) development of disposition recommendations based on the RIN scores. Results of this work will also support NASA open science initiatives and guides development of the NASA Scientific Collections Directive (a policy on best practices for curation of biological collections). Our RIN-based methodology for characterizing the quality of tissues stored in the ISC since the 1980s also creates unique scientific opportunities for temporal assessment across historical missions.

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