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Species-Level Identification of Animal Cells through Mitochondrial Cytochrome c Oxidase Subunit 1 (CO1) DNA Barcodes



This document provides recommended protocols for Species-Level Identification of Animal Cells through Mitochondrial Cytochrome c Oxidase Subunit 1 (CO1) DNA Barcodes. In accordance with the ATCC® Standards Development Organization, a consensus was met to assure the development of an accepted standard for biomaterials.

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1. OVERVIEW

1.1. Scope

Vertebrate and invertebrate animal cells and tissues are important *in vitro* systems and tools for scientists in diverse disciplines such as basic cell biology, taxonomy, and animal control (regulatory). An assay for species identity is crucial for the accuracy and reproducibility of each of these disciplines. The commonly employed isoenzyme analysis provides species confirmation of a very limited number of animal species and has been useful primarily only for authenticating cultured animal cells. A DNA sequence-based approach can be used for the identification of vertebrate and invertebrate animal cells at the species level by targeting variation in ~650 bp of the 5' region of the mitochondrial Cytochrome c oxidase subunit 1 (CO1) gene and by comparing the target sequence to a reference library of sequences derived from expert-identified specimens.

1.2. Scope Summary

DNA barcoding (CO1 analysis) can successfully identify a wide range of species from various animal taxa, even discriminating between species of the same genus and can be used for many sample types ranging from cultured cells to entire organisms. The technique is easily replicated among laboratories and, because the reference databases contain verified sequences derived from morphological voucher (reference) specimens, it provides a reliable means of validating the putative species identification of a sample. Such authenticated cultures/tissues can serve as standard reference materials or as controls of authenticated animal cells for tissue culture, regulatory, and taxonomic applications.

This document is intended for the identification of the species of origin of a tissue/organism sample and not for the identification of the organ from which these cells derived. Neither traditional methods of cell line authentication nor DNA barcoding can identify from which tissue in an organism a sample of cells originate.

This document was written by the ASN-0003 ATCC Standards Workgroup members, as listed below:

Jason Katz Cooper, MS [Workgroup Chair]
Biology Professor
Community College of Beaver County
1 Campus Drive, Monaca, PA 15061

Yvonne Reid, PhD [Workgroup Co-Chair]
Manager/Scientist, Cell Biology Program
ATCC
10801 University Boulevard, Manassas, VA 20110-2209