American College of Medical Genetics and Genomics

STANDARDS AND GUIDELINES FOR CLINICAL GENETICS LABORATORIES

2008 Edition with upgrades through March 2007

INTRODUCTION TO THE FOURTH EDITION (2007)

These ACMG *Standards and Guidelines* are developed primarily as an educational resource for clinical laboratory geneticists to help them provide quality clinical laboratory genetic services. Adherence to these standards and guidelines is voluntary and does not necessarily assure a successful medical outcome. These *Standards and Guidelines* should not be considered inclusive of all proper procedures and tests or exclusive of other procedures and tests that are reasonably directed to obtaining the same results. In determining the propriety of any specific procedure or test, the clinical laboratory geneticist should apply his or her own professional judgment to the specific circumstances presented by the individual patient or specimen. Clinical laboratory geneticists are encouraged to document in the patient's record the rationale for the use of a particular procedure or test, whether or not it is in conformance with these *Standards and Guidelines*. They also are advised to take notice of the date any particular standard or guideline was adopted, and to consider other relevant medical and scientific information that becomes available after that date.

The Fourth Edition of the ACMG's *Standards and Guidelines for Clinical Genetics Laboratories contains significant revisions in all sections. The Molecular Genetics section has been completely rewritten by a workgroup led by Dr. Kristin Monaghan. The Biochemical Genetics section was revised by a workgroup led by Drs. Tina Cowan and Piero Rinaldo, and the Cytogenetics section was revised by a workgroup led by Dr. James Mascarello.*

The *Standards and Guidelines for Clinical Genetics Laboratories* continues to be maintained and updated by the Quality Assurance Committee of ACMG.

FOURTH EDITION, 2007

Quality Assurance Subcommittee	Laboratory Practice Committee
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Betsy Hirsch, PhD	Michael S. Watson, PhD
James Mascarello, PhD	Judith Benkendorf, MS
Kristin Monaghan, PhD	

INTRODUCTION TO THE THIRD EDITION (2002)

This third edition of the ACMG's *Standards and Guidelines for Clinical Genetics Laboratories* contains several new areas and revisions in most sections. Clinical cytogenetics and FISH testing have been significantly revised. We are grateful to Dr. Daynna Wolff for leading those efforts. The first of several updates to the biochemical genetics section involving organic acids analysis was coordinated by Dr. Robert Grier. This edition is also distinguished by the first of what will be many disease-specific testing sections located in a new section. We are grateful to Dr. C. Sue Richards for her efforts to develop this section and to the work groups that wrote the individual sections. The disease specific guidelines require increasingly focused expertise on particular genetic tests. In order to acknowledge those who contribute to these sections we will list those involved in the individual work groups at the end the section to which they have contributed.

The *Standards and Guidelines for Clinical Genetics Laboratories* continues to be maintained and updated by the Quality Assurance Committee of ACMG.

THIRD EDITION, 2002

Quality Assurance Committee	**Cytogenetics Revision Working Group**
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Elaine B. Spector, PhD	

INTRODUCTION TO THE SECOND EDITION (1999)

This second edition includes several new sections, as well as modifications to previous sections. New sections were developed through the same consensus development process as was the first edition. Changes to materials in the first edition are intended largely to address areas of ambiguity. We are particularly grateful for the efforts of

Carolyn Sue Richards, PhD, for coordinating the molecular diagnostics efforts, and Laurel Estabrooks, PhD, for coordinating the efforts for interphase FISH based testing.

Standards and Guidelines for Clinical Genetics Laboratories is maintained and updated by the Quality Assurance Subcommittee of the Laboratory Practice Committee of the College.

ACMG Laboratory Practice Committee
Michael S. Watson, PhD, Past Chair

SECOND EDITION, 1999

Quality Assurance Subcommittee	**Laboratory Practice Committee**
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	George H. Thomas, PhD

INTRODUCTION TO THE FIRST EDITION (1993)

Genetic testing is among the most rapidly expanding fields in laboratory testing and clinical practice. New tests and technologies are being added to the already broad array of diagnostic tests available. The laboratories offering these tests work in close association with clinicians to ensure that the appropriate tests are provided to patients requiring these services. However, unlike other areas of clinical laboratory work, the results of genetic testing often have implications for the entire family. Hence, there are unique requirements for education and training in the field of human genetics which are critical to ensuring correct test result interpretation and appropriate counseling and referral of family members.

Through its developmental years, the clinical laboratory genetics testing fields have undergone various levels of standardization. Such standards have been developed by several professional organizations and regulatory agencies. With recognition of the American Board of Medical Genetics (ABMG) as the 24th primary specialty board of the American Board of Medical Specialties, the American College of Medical Genetics and

Genomics has taken on significance. In recognizing the broad implications of genetic testing and the critical need for high standards and self regulation, efforts were initiated in 1991 to update and broaden standards and guidelines for the practices of Clinical Cytogenetics, Clinical Biochemical Genetics and Clinical Molecular Genetics.

These efforts were initiated by the Organization of Clinical Laboratory Genetics (OCLG) which included the vast majority of clinical laboratory geneticists in the United States. The OCLG Steering Committee prepared the first drafts of this document from individual considerations and the following existing standards:

1. Association of Cytogenetic Technologists. Chromosome Analysis Guidelines Preliminary Report. American Journal of Medical Genetics 41: 566-569, 1991.
2. Jacky PB et al. Guidelines for the preparation and analysis of the fragile X chromosome in lymphocyte preparations. American Journal of Medical Genetics 38: 400-403, 1991.
3. New York State Dept. of Health, Wadsworth Center for Laboratories and Research. Genetics Laboratory Checklists. 1991.
4. Pacific Southwest Regional Genetics Network. Cytogenetics Quality Assurance Guidelines. (1991 Edition).
5. Great Lakes Regional Genetics Group. Quality Assurance for Cytogenetic Laboratories. (2nd Revision, 1992)
6 College of American Pathologists. Cytogenetics Laboratory Inspection Checklists. 1991.
7. ISCN (1995): An International System for Human Cytogenetic Nomenclature, Mitelman, F. (ed); published in collaboration with Cytogenet Cell Genet (Karger, Basel 1995); also in Birth Defects: Original Article Series, Vol. 21, No. 1 (March of Dimes Birth Defects Foundation, New York 1985).
8. ISCN (1991): Guidelines for Cancer Cytogenetics, Supplement to An International System for Human Cytogenetic Nomenclature, F Mitelman (ed); S. Karger, Basel 1991.

This draft was then sent to more than 50 external reviewers, including members of each of the Laboratory Quality Assurance Subcommittees of the Council of Regional Networks of Genetics (CORN), the members of the Genetic Services Committee of the American Society of Human Genetics (ASHG), and a number of individuals who requested that they participate. The comments and concerns of these reviewers were incorporated into the document. The entire document was then reviewed by over 300 laboratory geneticists prior to the 1992 meeting in San Francisco of the ASHG. Based on the consensus developed at that meeting, the final OCLG draft was prepared and submitted to the American College of Medical Genetics and Genomics (ACMG) to consider for endorsement. The Laboratory Practice Committee of the ACMG reviewed and modified the document for submission to the Board of Directors of the College. It was endorsed by the College on October 6, 1993.

ACMG Laboratory Practice Committee

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