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## Quantitative Image Analysis of Human Epidermal Growth Factor Receptor 2 Immunohistochemistry for Breast Cancer: Guideline from the College of American Pathologist<sup>1</sup>

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**Accuracy** - The degree of correctness or true values of a given laboratory result comparing to a gold standard. Accuracy also implies freedom from error.<sup>2</sup>

**Algorithm** - A sequential set of instructions used in calculations or problem solving. A diagnostic algorithm or a therapeutic algorithm consists of a stepwise series of instructions with branching pathways to be followed to assist a physician in coming to a diagnosis or deciding on a management strategy, respectively.<sup>3</sup> Image analysis algorithms are used to assist image-based assessment of digital pathology slides.

**Batch analysis** - An analysis in which all of the samples collected for a specific, nonemergent assay undergo the same testing process at the same time or sequentially.<sup>4</sup>

**Function Check** - Confirmation that an instrument or item of equipment operates according to manufacturer's specifications before routine use, at prescribed intervals, or after minor adjustment. Depending on the type of system, function checks may include calibration.<sup>5</sup>

**Instrument calibration** - A process of comparison in which an instrument is used to measure or is measured by a calibration standard, and the result is compared to two things: the known value and uncertainty of the standard and the performance specifications required by the customer. It quantifies the relationship between the readings of a measurement standard under controlled and specified conditions.<sup>6</sup>

**Inter-run reproducibility** - Also known as within-run precision. Replicates of the same sample across different run demonstrate high correlation.<sup>7</sup>

**Intra-run reproducibility** - Replicates of samples demonstrate high correlation in the same run. This is to monitor sample to sample variation.<sup>7</sup>

**Laboratory developed test (LDT)** - A type of in vitro diagnostic test that is designed, manufactured and used within a single laboratory according to the laboratory's own procedures.<sup>8</sup>

**Metadata** - Data/information that provides information about other data which include descriptive, structural and administrative metadata.<sup>9</sup>

**Precision** - The closeness of agreement between independent results of measurements obtained under stipulated conditions.<sup>2</sup>

\*Inactive guidelines are no longer updated with systematic literature reviews, but the recommendations may still be useful for educational, informational, or historic purposes.



**Quantitative image analysis (QIA)** - 1) A process whereby quantitative and meaningful information is acquired from the digital images of a specimen, and  
2) The computer-assisted detection or quantification of specific features in an image following enhancement and processing of that image, including analysis of immunohistochemistry samples, DNA analysis, morphometric analysis, and *in situ* hybridization.<sup>5</sup>

**Quantitative image analysis (QIA) system** - A system that integrates automated microscopy, high-quality image acquisition, and powerful analytical algorithms to detect, count, and quantify areas of interest and includes the hard-ware (computer, scanner, monitor, informatics network, etc.) as well as soft-ware (algorithms).<sup>10</sup>

**Region of interest (ROI)** - Also called a potential target or image-subregion; a portion of an image that is of interest and upon which an image analysis will be performed on.<sup>11</sup>

**Reproducibility** - The ability of a test or study to be duplicated either by the same researcher or by someone else working independently.<sup>12</sup>

**Revalidation** - A procedure used to assess a previously validated test's accuracy and reliability in detecting the marker of interest when there has been a change in test conditions (e.g. methods, equipment, or specimen or fixative types). The degree of revalidation required depends on the nature of the change.

**Validation** - A documented program that provides a high degree of assurance that a specific process, system or test method will consistently produce a result that accomplishes its intended purpose, meeting predetermined acceptance criteria.<sup>13</sup>

**Verification** - The process of evaluating a test or a product of a development phase to determine whether it meet the specified requirements. In the post-development phase, verification procedures to endure the product continuously meeting the initial design specifications.<sup>13</sup>

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