Chapter 6

Grid Technology in Telepathology and Personalised Treatment

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ABSTRACT

Histopathology requires automation, quality control and global collaborative tools. Usually the PIMS (Pathology information management system) automates samples, images and reports and progressively incorporates the PI (Pathology informatics), the D-PATH (digital pathology), e-PATH (electronic pathology), the PPH (Patho-pharmacology), virtual autopsy (VA) and all type of translational research in the PMIS. Not being subject to a specific standard, quality control follows ISO-13485:2003 on services and medical devices, ISO 17025:2005 on technical aspects; and ISO-15198:2003 for automate and quantifiable procedures that will be affected by the new European Directive on medical devices. For the non-standardized pathology procedures, consumer’s requirements are what define test and calibration procedures. The paper analysed the non-standardized procedures: VS (Virtual Slides), GRID networking and Literature Based Discovery as tools for knowledge discovery of relevant relationships on image-diagnosis and personalized treatments. Standardized procedures available for search and annotation are the ISO/IEC 11179 Information Technology Metadata Registries specification, the ISO/IEC 13250:2003 for topics maps or MPEG-7 & 21 for images and the ISO/IEC 24800-3 for JPEG query search. The

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forthcoming innovations prepare to quality certify the so called “solo-pathology” robotic labs, supported by telepathology to reduce diagnostic errors and carrying out a relevant task on personalized treatment through GRID technology. In this environment the JPEG query search play a relevant role on images which metadata can be annotated on natural language.

**INTRODUCTION**

Quality control of the health-care laboratories include: (1) Management requirements according to ISO 9001:20001 norm or its equivalent ISO-13485:2003 (ISO 13250, 2003) for medical devices and services. (2) Technical requirements inside of the ISO 17025:2005 (ISO17025, 2005) norm for testing and calibration, the (3) ISO 15189:2007 or quality and competence of microbiological and clinical laboratories and (4) finally the norm ISO/TS 22367:2008, which are the technical specifications of risk reduction and risk management in laboratories.

The ISO 15189 norm was intended for microbiology and clinical laboratories, peculiar because their reports only have objective results without diagnostic interpretation.

The ISO 15189 includes management issues following ISO 9001 norm and technical issues following ISO 17025 norm. The technical direction responsible of quality-DTC is in charge to define **politics and objectives** (Service goal, level of services, Quality objectives) (Gimenez, 2007; SEAP, 2003) including internal and **external controls** (instrument calibration, reactive and systems). Everything should be documented in a **quality manual**.

Nowadays differences between clinical laboratories and pathology departments have shortened due to automation (VLA, 2006; Garcia-Rojo, 1998), quantitative pathology (FISH-HISH-cytogenetic and tumour markers, IHQ etc.) and pharmaco-pathology for therapeutic targets involving or not GRID diagnostic support of distributed computation (Schmitt, 2007).

A pathology department should consider the quality standards and risk management of the new EU directive of medical devices (ISO11073, 2008; IEC60601, 2006; ISO14971, 2007; DIR2007, 2007) together with technical advances of informatics (PI, 2008; Becich, 2008)

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**Table 1. ISO 15189:2007 Critical points in laboratories**

<table>
<thead>
<tr>
<th>Personnel competency</th>
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<tr>
<td>Laboratory installations and devices</td>
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<td>Validation of the analytical process</td>
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<td>Validation of the ICT</td>
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<td>Ethic code, confidentiality and data security</td>
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<td>Post-analytic processes. Laboratory reports.</td>
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<td>Implementation, follow up and improvement.</td>
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<td>Risk management / priorities</td>
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<td>Quality assurance of analytical processes</td>
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<td>Auditing, Review of system quality management by the direction</td>
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