The easy bit

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ABSTRACT

Technology is the easy part these days. The real challenge lies in what happens before, after and around the machine: interpreting data, managing processes and turning innovation into quality. Because the laboratory of the future will not be the one with the most expensive equipment, but the one capable of asking the right questions and making the most of the skills of those who use it.

There is a sentence in this issue that is worth reading twice. Priya Prasad writes it whilst discussing blood banks: **acquiring the technology is the easy part**. Barcode scanners, data loggers, LIMS: we have them all; in fact, if we ask a centre how many bags it distributed last year, the answer comes in a matter of seconds. If, on the other hand, we ask what those figures predict for next year, silence falls over the room. The blood bag remembers everything. The question is whether anyone is listening to it.

This is the common thread running through an issue dedicated to laboratories, technology and innovation. Technology, today, is the easy part. The difficult part — the one that determines quality — lies before, after and around the machine.

Before the machine. Naglaa ElWkil reports a tacrolimus level of 21 ng/mL, leading to a dose reduction; two days later, a peripheral blood sample yields a result of 4.1. The dosage was correct, but the sample was not: it had been taken from the lumen used to infuse the same drug. A result can be technically correct yet clinically misleading. Between the bed and the analyser, there is no control chart: there is the nurse, the first step in the analysis.

After the machine. Federica D’Amato reviews the applications of artificial intelligence in the assisted reproduction laboratory and highlights a fact that should be on every table where investment decisions are made: in a randomised trial involving over a thousand patients, embryo selection using deep learning failed to demonstrate non-inferiority compared with conventional morphology. Algorithmic accuracy and clinical benefit are not the same thing. Renata Vaiani highlights the other side of the coin: an AI-based faecal test analysing the microbiome achieves 90 per cent accuracy compared to 94 per cent for a colonoscopy, using a sample collected at home. It does not replace colonoscopy; rather, it better identifies who needs

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to have one; and a simple test is one that people actually have. Quality is simplicity.

Around the machine. Bilal Abdou proposes a laboratory in which quality, appropriateness, digital technology, the environment and resilience reinforce one another: appropriateness does not mean carrying out fewer tests, but increasing the value of each one, and a continuity plan that has never been tested remains merely a plan on paper.

Tommaso Mannone applies the same question to a field that is only apparently distant: the management of narcotic drugs in hospitals, in the light of the draft Italian ministerial decree. Computerised records, profiling, historical tracking: the tools are there. But a shared password in the heat of a shift retroactively nullifies the entire traceability, and a system crash produces fallback records that nobody reconciles. The right question is not ‘are we compliant?’, but ‘if a discrepancy were to emerge tomorrow, would we be able to reconstruct what happened?’. It is the difference between a document that describes and a document that learns.

There is also an innovation that does not stem from an algorithm, but from a different perspective on what we already have. Giuseppa Tancredi recounts the experience of the Sciacca Regional Cord Blood Bank: units donated but unsuitable for transplantation due to insufficient cell count which, instead of being discarded, are turned into platelet lysate eye drops for patients with ocular GvHD resistant to previous treatments. Of the twenty-two patients treated, seven out of nine corneal ulcers had healed completely at ninety days, with no adverse events reported. No donation should go to waste: it is the same logic behind Priya Prasad’s blood bag, applied to biology rather than data.

All these contributions, however, rest on one condition: skills and knowledge. A tool in the hands of someone who does not know how to interpret it does not produce innovation, but a new risk. The authors themselves say so: a nurse’s competence must be verified by observing their actions; the embryologist remains responsible for the final verification; in the draft decree, training becomes a qualifying requirement; change begins when someone knows how to interpret the data. Technology can be bought; competence is built.

With artificial intelligence, this aspect does not lose importance: it gains it. There is a growing perception that AI means fewer skills are needed, because the machine will ‘know’ for us. The opposite is true. The more powerful the tool, the more you need to know what to ask of it, how to interpret its output, and when not to trust it. Without the right skills, AI doesn’t simplify things: it amplifies errors and makes them harder to spot. The bar isn’t lowered – it’s raised.

Here is the common thread: the laboratory of the future will not be the one with the most

expensive equipment, but the one that knows how to ask the right questions of what it has (data, samples, algorithms, units currently discarded, procedures).

Innovation means moving from collecting to understanding, from documenting to learning, from possessing to managing.

This serves as a bridge to the next issue, dedicated to quality, skills and continuous improvement: because no artificial intelligence can replace the expertise of those who must manage it.

Enjoy the read.

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