

## **FROM SAMPLES TO STORIES: WHY YOUR HLA LAB NEEDS A PATIENT-CENTRIC LABORATORY INFORMATION MANAGEMENT SYSTEM**

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Laboratory Information Management Systems (LIMS) in HLA laboratories face unique challenges due to the complex nature of transplant immunogenetics workflows. Unlike traditional clinical laboratories that process individual samples, tissue typing laboratories must manage donor-recipient interactions, crossmatch relationships, and comprehensive immunological histories across multiple testing modalities.

We implemented and evaluated a locally developed LIMS (labOS) at Rabin Medical Center's tissue typing laboratory, Israel's largest transplant center serving multiple programs nationwide. We systematically assessed the system's performance against HLA laboratory workflow requirements and compared our experience with alternative existing 'off the shelf' market solutions.

The implementation revealed critical limitations in sample-centric LIMS architecture for transplant immunogenetics applications. Major challenges included: inability to associate crossmatch results with specific donor-recipient pairs when single samples serve multiple crossmatches; fragmentation of patient immunological profiles across disconnected sample records; inadequate result management for complex scenarios involving multiple potential donors; and inflexible reporting systems unable to accommodate transplant-specific clinical requirements. Market analysis revealed that existing commercial solutions (e.g. SoftHLA™ and HistoTrac™) address these limitations through patient-centric architectures, comprehensive patient dashboards, and virtual crossmatching capabilities.

Effective LIMS implementation in HLA laboratories requires patient-centric rather than sample-centric system architecture. The fundamental design philosophy of organizing data around patients rather than individual samples is critical for supporting transplant medicine workflows. Our experience provides a framework for HLA laboratories to evaluate LIMS solutions and avoid architectural mismatches that compromise clinical workflow efficiency.

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