

SIEMENS


ADVIA Centaur® XPT
Immunoassay System

Case
Study

[siemens.com/healthcare](https://www.siemens.com/healthcare)

Workflow and Efficiency Advantages of the New ADVIA Centaur XPT Immunoassay System

Dr. Roberto Rosso, Dr. Elda Suigo, and Dr. Giulio Vignati



“At peak workload times, we appreciate the robustness and reliability of the connected systems for maximizing operational efficiency. The ADVIA Centaur XPT system exceeded our expectations.”

Workflow and Efficiency Advantages of the New ADVIA Centaur XPT Immunoassay System

by Dr. Roberto Rosso¹, Dr. Elda Suigo¹, and Dr. Giulio Vignati².

Introduction

Our laboratory at Ospedale di Magenta has always adhered to workflow policies aimed at continuously improving analytical performance and optimizing resources. The ADVIA Centaur® Immunoassay System was introduced in the late 1990s,³ and with its robustness, flexibility, reliability, and broad assay menu and analytical measuring ranges, it helped increase our degree of organization. In parallel with the technical progression of the ADVIA Centaur product line, there has been a considerable improvement in the quality of reagents.

Gratified by the achievement of these high-quality standards for reagents and analyzers, in recent years we have focused mainly on rationalizing the decreasing resources available by looking for solutions designed to improve our operational efficiency. To be able to perform 1.6 million tests per year (including 150,000 immunochemistry tests) for routine and emergency testing, consolidate workstations, standardize workflow, achieve fast turnaround time (TAT), and provide high-quality results, we decided in January 2014 on a Siemens solution.

The configuration of the Siemens solution includes two Dimension Vista® 1500 Intelligent Lab Systems and one ADVIA Centaur XP Immunoassay System connected to the Aptio® Automation solution, and one stand-alone IMMULITE® 2000 XPi Immunoassay System (Figure 1). The type and distribution of the tests on the analyzers is shown in Table 1. All systems were running in routine in January 2014 as planned. We have fully achieved our workflow and efficiency goals, and all



Azienda Ospedaliera "Ospedale Civile di Legnano" Ospedale di Magenta Unità Operativa Complessa (U.O.C.) Laboratorio Analisi*

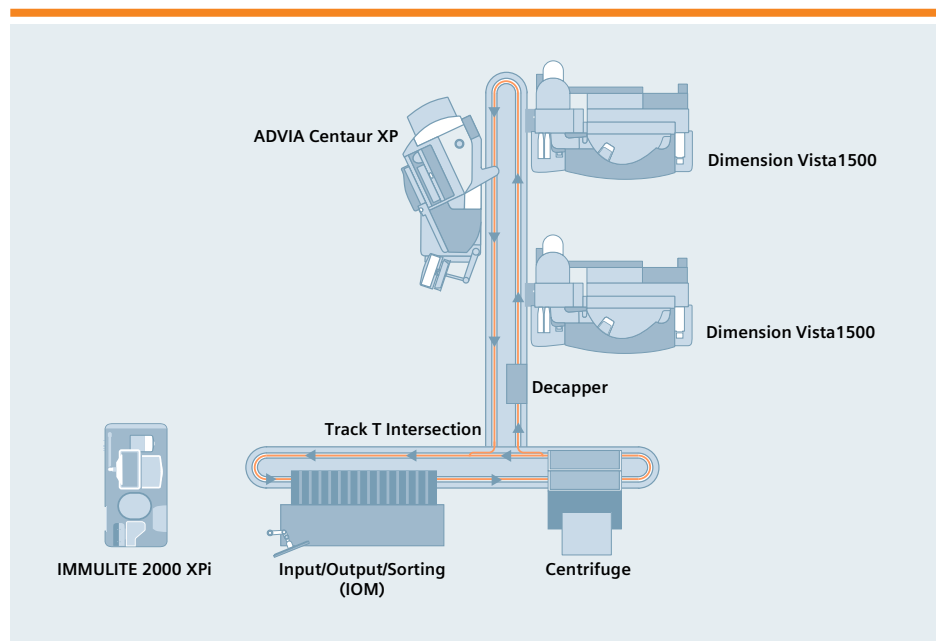





Figure 1. Clinical chemistry and immunochemistry consolidation configuration: two Dimension Vista 1500 Intelligent Lab Systems, ADVIA Centaur XP System, and IMMULITE 2000 XPi System

*In 2016 the laboratory and the hospital changed their name to Azienda Socio Sanitaria Territoriale Ovest Milanese. Ospedale di Magenta Unità Operativa Semplice (U.O.S.)

Table 1. Clinical chemistry and immunochemistry consolidation: type and distribution of assays.

Dimension Vista 1500 Intelligent Lab Systems (2)	ADVIA Centaur XP System	IMMULITE 2000 XPi System	
			
<div>Cardiac markers CRP Electrolytes Enzymes Ethanol Ferritin hCG PSA Substrates Therapeutic Drug Monitoring Thyroids</div> <div>49 assays</div>	<div>Angiotensin Converting Enzyme* Bile Acids* Cardiac markers Electrolytes Enzymes Ferritin PSA Specific Proteins Substrates Thyroids Urine Analysis</div> <div>51 assays</div>	<div>AFP CA 19-9 CA 15-3 CA 125II CEA Cortisol C-Peptide Enhanced Estradiol FSH Insulin Intact PTH LH Testosterone Procalcitonin Progesterone Prolactin Vitamin D Total</div> <div>17 assays</div>	<div>Androstenedione Anti-TG Anti-TPO β2-Microglobulin Calcitonin DHEAS Erythropoietin (EPO) free β hCG Gastrin H. pylori IgG hGH IGF-1 PAP PAPP-A Pyrilinks-D SHBG Thyroglobulin</div> <div>17 assays</div>

* User-defined application

our operators have been completely satisfied with the robustness and reliability of the entire system.

In late 2014, Siemens gave our laboratory the opportunity to conduct a field assessment of the new ADVIA Centaur XPT Immunoassay System, which was planned to be launched worldwide in early 2015 and which offers significant technological innovations. The aim of the assessment was to collect as much information as possible on the overall performance of the new analyzer. Given that there were no assay formulation changes—the assays on the ADVIA Centaur XP system are the same as those on the ADVIA Centaur XPT system—we did not see it as a priority to perform method comparison evaluations between the two systems.

Objectives of the ADVIA Centaur XPT Immunoassay System Assessment

- Compare manual hands-on time for maintenance tasks and identify time savings
- Assess whether the reliability of the ADVIA Centaur XPT system has improved over the previous system
- Evaluate benefits of the new user software
- Compare QC results for the assays

Methods

The new ADVIA Centaur XPT Immunoassay System represents a technological advance over the previous ADVIA Centaur XP model. It retains most of the structural and functional characteristics of the previous model and adds a number of significant improvements. The most obvious improvement is the new user software, which is based on icon-driven navigation and is extremely easy to use. It was designed to be shared across the entire ADVIA® Clinical Chemistry and Immunochemistry line. The software

incorporates the option of complete quality control (QC) management and therefore overcomes a limitation of the previous ADVIA Centaur XP model, which required an additional PC to perform this function. Lastly, it is now possible to save specifications relating to new lots of calibrators without having to interrupt system operation.

The 2-D bar-code reader is another substantial improvement. The bar-code reader allows you to upload new test definitions and assay parameters to the system software without the need for Siemens specialist support.

The new ADVIA Centaur XPT system is equipped with a UV light, which automatically illuminates the distilled water in the water reservoir bottle every day, keeping it free of bacterial contamination. In addition, the ADVIA Centaur XPT system has a newly developed tubing system with robust valves for water circulation, reducing downtime and user intervention. The design incorporates ergonomic and operator safety improvements such as covers that are locked during system operation, a simple but useful solution that we appreciate.



“A significant development is the evolution of acridinium ester technology, with recent formulations contributing to significant improvements in analytical sensitivity, increased onboard stability, and a drastic reduction in the sample volume used for analysis.”^{4,5}

To meet the conditions specified for the assessment, an ADVIA Centaur XPT system was installed in stand-alone configuration next to the ADVIA Centaur XP system connected to the track. The new system was connected to the automatic deionized water-purification system (EMD Millipore Elix Essential 5 Water Purification Systems) and to the laboratory middleware (LabOnline, OMNILAB), which was also set up to allow bidirectional connection with our quality control management software (Unity Real Time, Bio-Rad Clinical Diagnostics). The same assays in use on the ADVIA Centaur XP system and shown in Table 2 were made operational.

Routine lab operation was simulated on the ADVIA Centaur XPT system from November 1 through December 30, 2014, using the samples analyzed on a daily basis on the ADVIA Centaur XP system. Calibrations were periodically performed for all the reagents in use. The analyzer maintenance specified by Siemens was performed throughout this period.

Results and Discussion

When seeing the ADVIA Centaur XPT system for the first time, one is struck by the large 22-inch touchscreen. It contains

new management software that one immediately notices is very intuitive and easy to navigate. It takes very little time to learn how to click through the software functions, which open in an extremely logical and orderly sequence. Everything is made simple by the constant presence of a menu bar at the top (Figure 2), which enables the operator, from anywhere in the software, to gain direct access to the desired group of commands and hence to the respective functions. The graphic design is attractive and effective. All it takes is a quick glance to have a clear

Table 2. ADVIA Centaur XPT assays used in the assessment.

Assays
AFP
CA 15-3
CA 19-9
CA 125II
C-Peptide
CEA
Cortisol
Enhanced Estradiol
FSH
Insulin
Intact PTH
LH
Procalcitonin
Progesterone
Prolactin
Testosterone
Vitamin D Total

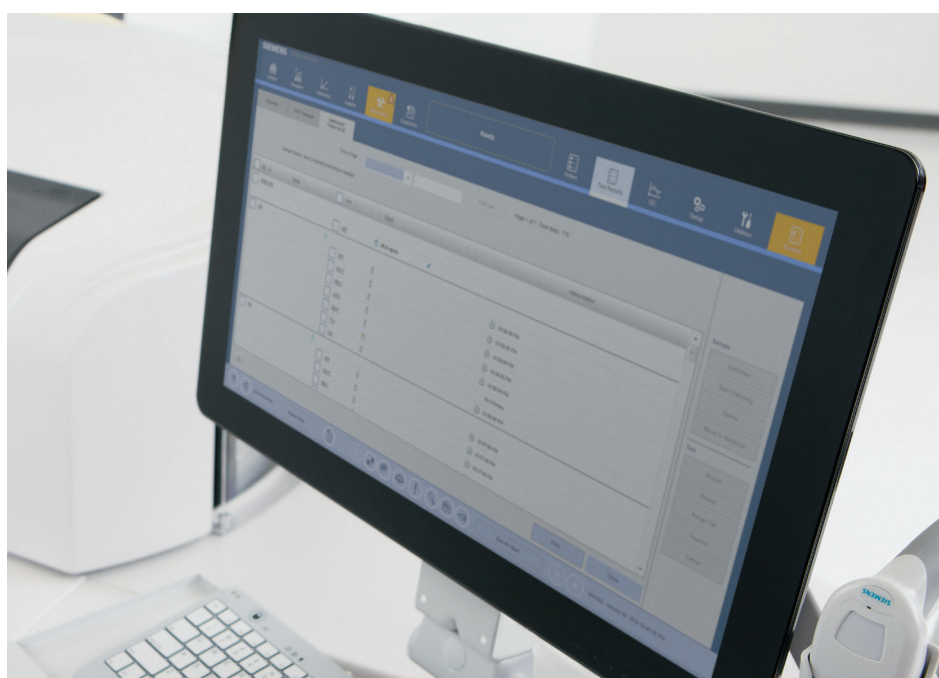


Figure 2. Analytical Results window. At the top of the screen are menu icons for accessing system functions and data management information.

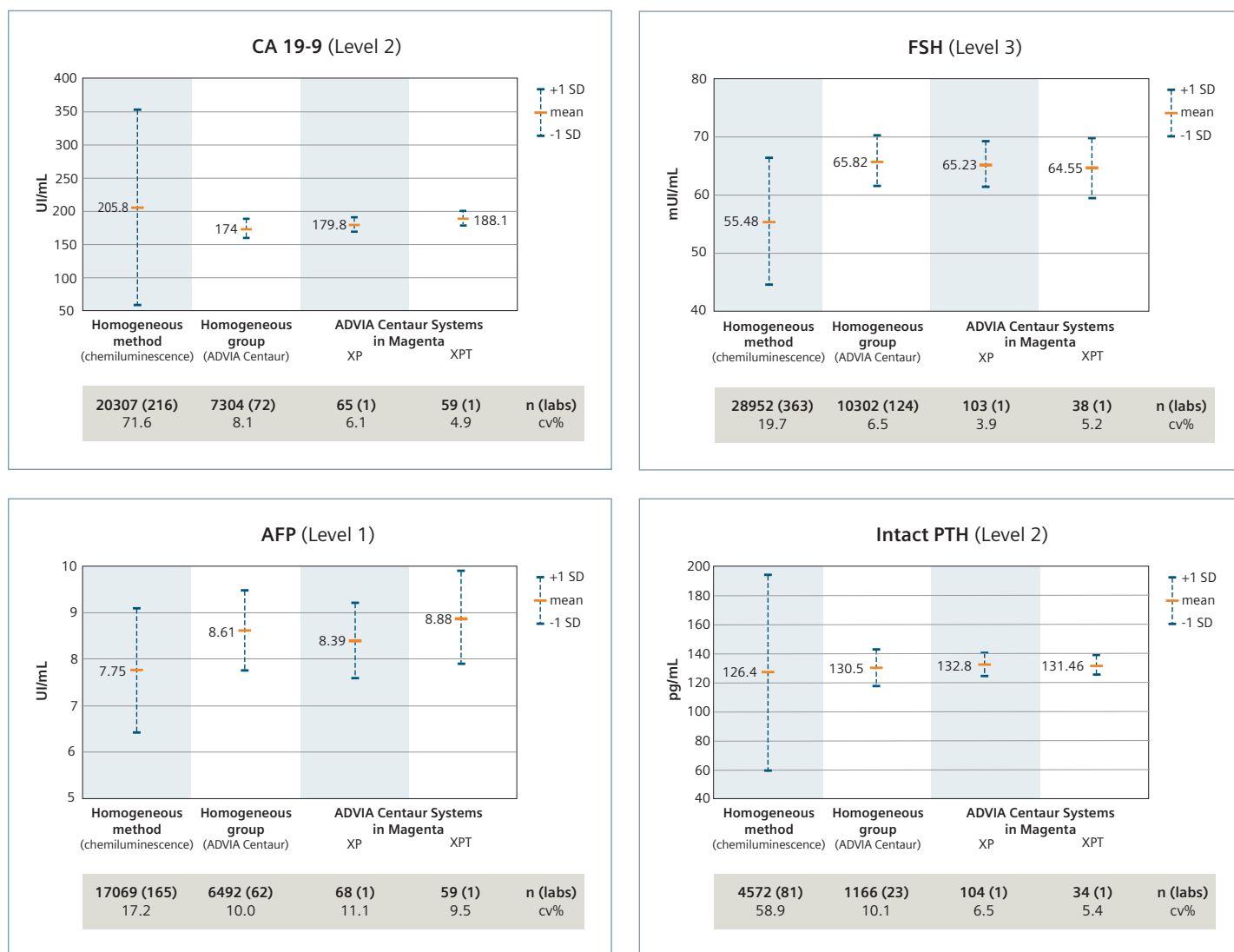


Figure 3. Examples of the quality control results for the ADVIA Centaur XP and ADVIA Centaur XPT systems for selected assays (QC material: Bio-Rad Lyphochek Tumor Marker Plus Quality Control and Bio-Rad Liquechek Immunoassay Plus Quality Control).

overview of the reagents inventory, the system flags and event log files, and the audit trail. The analytical results appear in a very well-organized window with a large number of default and custom filters, which can be configured by the operator. Easy-to-interpret graphic symbols allow quick recognition of the status of every single result (Figure 2). The new user software provides a wide range of operator information. For example, it enables the user to kinetically trace every phase of any measurement cycle or even constantly record the room temperature. All software and system functions and overviews are clear and easy to interpret.

The ADVIA Centaur XPT system was introduced into our daily work routine in the beginning of 2015. It took just a few hours to connect the system to the Aptio® Automation solution and replace the ADVIA Centaur XP system. At one year after installation, we can state that there was no need for unscheduled technical support service visits.

Although examining the analytical performance of the new ADVIA Centaur XPT system was not among the primary aims of the assessment, we would still like to provide a brief summary of the results of quality control tests obtained with certain methods (Figure 3).

During the test period, all the results of the quality controls carried out on the ADVIA Centaur XPT system were automatically exported to our expert system of analytical quality management (Unity Real Time, Bio-Rad Laboratories). As the examples in Figure 4 show, the ADVIA Centaur XPT system's QC results were very similar to those of the ADVIA Centaur XP system.



“This excellent assay correlation can be attributed to the fact that all reagents are identical on both ADVIA Centaur systems.”

Conclusions

The new ADVIA Centaur XPT Immunoassay System is the result of a brilliant alchemy that combines new user software with additional management functions, an analyzer featuring improved technology and an assay offering of proven excellence. The most striking advantage that is apparent the first time one uses the analyzer is the intuitive and easy-to-use new software: This reduces operator training time both initially and after being away from the system for some time in other lab areas. Furthermore, we believe that equipping the immunochemistry and clinical chemistry systems with the same user software represents further significant added value.

In fact, we were pleasantly surprised by its reliability, which was underlined by the fact that we did not need any unscheduled technical support visits over the course of the first year of operation.

Another significant practical advantage is the new technological solution of the UV light for daily disinfection of the water reservoir bottle, which reduces monthly maintenance by 12 hours per year and operator maintenance time by 60 percent, as shown in Figure 4.

Our overall findings support the high analytical performance of the new system. We conclude that the new ADVIA Centaur XPT Immunoassay System has brought our laboratory obvious, measurable benefits in reliability and workflow optimization compared with the previous ADVIA Centaur XP Immunoassay System.

References

1. Azienda Ospedaliera “Ospedale Civile di Legnano” Ospedale di Magenta Unita Operativa Complessa (U.O.C.) Laboratorio Analisi
2. European Ligand Assay Society, Italy (ELAS)
3. Taieb J, Benattar C, Birr AS, Poüs C. From ACS-180 to ADVIA Centaur (Bayer Diagnostics): assessment of estradiol, progesterone, LH and FSH assays. [Article in French] Ann Biol Clin. 2003 Mar-Apr;61(2):223-8.
4. Dotti C, Fortunato A, editors. Le analisi immunometriche: basi teoriche e applicazioni cliniche. Padova: Piccin Nuova Libreria; 2014.
5. Natrajan A, Sharpe D, Costello J, Jiang Q. Enhanced immunoassay sensitivity using chemiluminescent acridinium esters with increased light output. Anal Biochem. 2010 Nov 15;406(2):204-13. doi: 10.1016/j.ab.2010.07.025. Epub 2010 Jul 27.

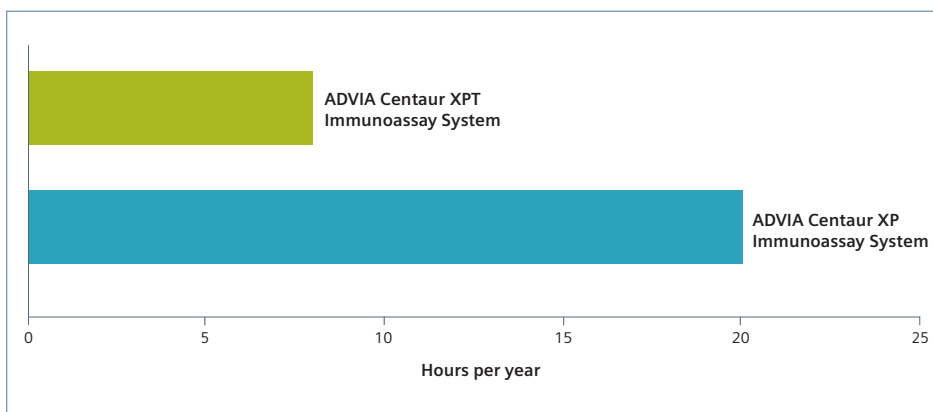


Figure 4. Monthly maintenance activity comparison

ADVIA Centaur, Aptio, Dimension Vista, IMMULITE, and all associated marks are trademarks of Siemens Healthcare Diagnostics Inc., or its affiliates. All other trademarks and brands are the property of their respective owners.

Product availability may vary from country to country and is subject to varying regulatory requirements. Please contact your local representative for availability.

Local Contact Information

Siemens Healthcare
Laboratory Diagnostics
511 Benedict Avenue
Tarrytown, NY 10591-5005
USA
Phone: +1 914-631-8000
siemens.com/healthcare

Siemens Healthcare Headquarters

Siemens Healthcare GmbH
Henkestr. 127
91052 Erlangen
Germany
Phone: +49 9131 84-0
siemens.com/healthcare