For strained labs, hematology analyzers doing

Karen Southwick

iagnostics manufacturers, serving labs that have to do more work with less staff and money, are

responding with instruments that automate increasingly complex tasks.

The latest round of hematology analyzers from five vendors—Abbott Laboratories, ABX Diagnostics, Bayer Diagnostics, Beckman Coulter, and Roche Diagnostics—offers such features as autoverification, low maintenance, and simpler interfaces.



Johnson

"The focus for hematology is on workflow improvement and in-

creased efficiencies," says Mary Beth Johnson, product manager for Beckman Coulter, Brea, Calif. "We want to decrease interaction of the technologist with the analyzer" to streamline workflow.

Ruth Becker, marketing manager for quality control and automation with Abbott's hematology unit in Santa Clara, Calif., says one aim is to reduce review rates and the need for manual intervention, "decreasing your need to have a highly trained work-

"Having high-quality analyzers can help retain trained staff by reducing the tedium of having to repeat tests or do them manually," says Andy Hay, business alliance manager for the Sysmex instruments at Roche Diagnostics, Indianapolis.

In hematology, change has come quickly. "The state of the art has moved faster in hematology than any other [diagnostic] discipline," says Jim Mulry, director of marketing for ABX Diagnostics, Irvine,



Calif. Thanks to improved software and optics, the linearity in new machines is almost doubled from previous years, he says.

Expanded linearity—wider ranges to interpret results from analyzers rather than resorting to a manual procedure—will allow an instrument to handle a high white cell count without the need for a medical

technologist to do serial dilutions, a high-complexity test under CLIA '88. For blood banks, increased linearity makes it possible to process higher platelet counts, maximizing the production of platelets for transfusion.

Automated quality control is another advance. "You have ongoing readings that tell you how precise and accurate the results are," Mulry says. "You can do online verification of accuracy at any time." He credits Abbott with introducing automated QC several years ago, but, he says, "now that feature is getting better and better in all the machines."

istinguishing features

In the annual CAP TODAY survey of hematology analyzers (pages 39-52), vendors were asked what features distinguish their systems from those of competitors. All five manufacturers cited improvements in detecting reticulocytes and immature cells, onboard quality control monitoring, and better linearity. High-end analyzers typically offer add-on slide-maker capability.

ABX's Mulry singled out the autoverification feature in its high-end Pentra 120. "The operator can program in an algorithm that allows the system to auto repeat" if the results are not within defined parameters, he says. For instance, if a patient shows a high white blood cell count, the analyzer will find the tube, resample, and rerun the test.

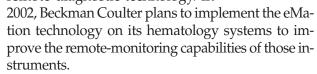
The next generation of ABX hematology instruments is due out in summer 2002. The Pentra 80 hematology analyzer will have an onboard internal diluting system. The onboard dilution is a reflex test that will be performed automatically on the Pentra 80 should the sample require it, Mulry says.

Beckman Coulter stressed its autoverification technology, as well as "zero routine daily maintenance" and its remote monitoring and service technology.

"We look at certain parameters from the instrument and analyze trends to see if something is going wrong," says Naomi Culp, senior

product manager, cellular analysis. "Then we call the customer to schedule service before it becomes an issue. We're the first in the industry to implement this proactive customer care."

Earlier this year, Beckman Coulter signed an agreement with eMation, which makes Internet-enabled remote diagnostic technology. In



Culp

Within the next year, Beckman Coulter also expects to introduce an instrument that can perform other body fluids, including spinal fluid. "It's a matter of picking the tests that are automatable," Culp says, and obtaining Food and Drug Administration clearance. Abbott, too, believes that automating body fluid analysis is essential for future hematology systems.

Roche's Hay says the Sysmex line is moving forward using automated flow cytometry, which makes it possible to "probe cellular contents more accurately, identify abnormalities more clearly, and enumerate the abnormal events." Sysmex has introduced nucleated red cell counting, which can be a major source of manual review. "The new machine will automatically recalculate white cells and the differential," he says.

Abbott also stressed its flow cytometry capability. With its top-level analyzer, the Cell-Dyn 4,000, which contains an argon ion laser, "nucleated red blood cell counting is automatic as part of any routine WBC count and differential," says John Cieslewicz, marketing manager for the Abbott hematology business unit. Abbott, he adds, pioneered the use of fully automated monoclonal antibodies in routine hematol-

Another Cell-Dyn product, the Cell-Dyn Work-Cell, has automated data-review capability. Says Abbott's Becker, "You can program in certain criteria and the system will determine whether repeat testing is required." For example, "if you had a resistant red cell, you could set the criteria to automatically reflex to that mode. The operator wouldn't have to do anything," she says.

Bayer Diagnostics, Tarrytown, NY, has expanded its product line with a mid-range analyzer, the Advia 70, which can be used as a backup or as the primary instrument for smaller laboratories, says Leslie McVeigh, marketing manager for hematology at Bayer. The Advia 70 offers such features as zero daily maintenance, automatic recounts, and micro-sampling for pediatrics. "You can select the sample-saver mode, which uses half the volume to perform the testing,"

Bayer also recently upgraded its Advia 120 hematology analyzer. The company received FDA clearance for the Advia 120 to analyze cells in cerebrospinal fluid. And Bayer plans to roll out a new automated quality control package for hematology in early 2002. The product, accessible via the Internet, will allow users to review quality control in real time.

With the wide range of available instruments, "it's important for customers to determine and prioritize their goals," McVeigh says. "Some questions to ask are: Are you looking to expand your laboratory services? What new areas do you want your lab to enter? What are the issues with your current systems? Do you have a need to reduce costs, labor, et cetera?"

hopping the systems

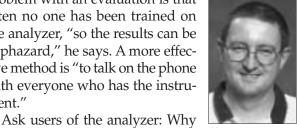
In making the purchase decision, the lab must understand its operational costs for handling blood analysis, McVeigh says. "You need to look at more than just price. Look at your long-term operational goals rather than just short-term price savings." Most laboratories will be able to assess their cost per test, "but that's not the whole story," she says. "You need to look at the labor involved, replacement costs, your review rates, and supply costs."

Evaluating competing analyzers in your laboratory can be helpful, but it consumes time and resources. A better option may be to talk to peers who use specific analyzers before making a purchase.

"I would give more credence to peer group review—contacting other users—than to bringing an instrument in and testing it," says Roche's Hay. The

problem with an evaluation is that often no one has been trained on the analyzer, "so the results can be haphazard," he says. A more effective method is "to talk on the phone with everyone who has the instru-

did you pick this instrument? How



has it increased productivity? How has it affected workflow? Has it reduced review rates? How easily can one be trained on it? How does it impact the patient?

"If you're going to test it yourself, make sure you do it right by running through a series of standard protocols," Hay advises.

ABX's Mulry recommends empirical testing. "Let the operators who are going to run the system establish the criteria to buy a system, and bring the instrument in for an in-house evaluation," he says.

Among the questions laboratorians should ask themselves: Does the analyzer do all the tests that I need? What processes will I have to change to use the machine? And they need to ask the vendor: As technology improves, can the analyzer add functionality? What is the frequency of maintenance and the cost?

Karen Southwick is a writer in San Francisco.

December 2001

High-volume hemat	CAP TODAY / 39
ligh-volume hemat	ology analyzers 🔭
art 1 of 8	Abbott Diagnostics Steven T. Dethlefsen steven.dethlefsen@abbott.com 100 Abbott Park Rd., Bldg. AP6C-5, Dept. 02KL Abbott Park, IL 60064 800-323-9100 ext. 7-8134 www.abbott.com
ame of instrument rst year sold-installed in U.S./outside U.S. o. units installed in U.S./outside U.S./list price	Cell-Dyn 3200 1997/1997 >700/>1,500/\$165,000
est menu: •Chartable	standard menu (left) plus: RDW, MPV
All instruments have: BC, RBC, Hb, Hct, MCV,•Laboratory CH, MCHC, Pit, %&# neut, ono, lymph, eos, baso •Flags	band #&%, IG #&%, variant lymph #&%, blast #&%, PCT, PDW, NRBC #&% band, IG, variant lymph, blast, NRBC, NWBC, RRBC, FWBC,
DA-cleared tests but not clinically released ests not avail. but submitted for clearance ests in development or research-use-only	RBC morph., high/low interp. message, LRI, URI, LURI, WBC none none none none
ests unique to analyzer	3-dimensional optical RBC analysis with advanced MCV measurement
ifferential method(s) used nearity: •WBC count (10 ⁹ /L)/RBC count (10 ¹² /L) •Hemoglobin (g/dL)/platelet (10 ⁹ /L) •MCV (fL) or Hct (%)	MAPSS (Multi-Angle Polarized Scatter Sep.) 0-250/0-8 0-25/0-1,750 35-180 (MCV)
ecision: •WBC count/RBC count •Hb/platelet •MCV or Hct ccuracy of automated diff. compared with manual diff.,	≤2.7%/≤1.5% ≤1.0%/≤4.0% ≤1.0% (MCV) neut #&%: ≥0.95, lymph #&%: ≥0.94, mono #&%: ≥0.86, eos
per NCCLS H-20A terfering substances:•WBC •RBC	#&%: ≥0.84, baso#% ≥0.73 NRBCs, lytic-resistant RBCs, Plt clumps, cryoglobulin and cryofibrinogen, fragile WBCs elevated WBC count, increased numbers of giant Plts,
•MCV or Hct	autoagglutination, in vitro hemolysis MCV: elevated WBC count, hyperglycemia, in vitro hemolysis increased no of piant Plts
•Platelet	sis, increased no. of giant Plts WBC fragments, in vitro hemolysis, microcytic RBCs,
•Hb	cryoglobulins, Plt clumping, increased no. giant Plts elev. WBC count, incr. plasma substances (triglycerides, bilirubin, in vivo hemolysis), lyse-resist. RBCs
terfering substances: differential	n/a
ge- and sex-specific reference ranges ax. CBCs per hr/max. CBCs & diffs. per hr ecommended avg. frequency of calib. •Modes calibrated/parameters calibrated requency of blood/latex controls in. specimen vol. open/closed/sample dead vol. closed ube sampling supported eterinary capability	yes 78/78 6 mos verification open &/or closed/WBC, RBC, Hb, MCV, Plt, MPV 2 levels every 8 hrs/n/a 130 µL/250 µL/1 mL (sample loader) yes no
licrosample capability repares microscopic slides automatically or flags problems for slide prep auto. slidemaker avail., no. installed/list price	yes yes 80/\$125,000
rchives patient data for later comparison atient-specific archiving	yes yes
ax. archived data accessible when system online lemory capacity—numeric results–no. specimens lemory capacity—histo/cytograms–no. specimens	10,000 results 10,000 results 10,000 results
Stored in conjunction with CBC data Histo/cytogram images & CBC data printed as 1 report aved results can be recalled and retransmitted	yes yes yes
aved data can be sorted for reprocessing or report transmission erforms delta checks ags and holds results for followup, confirm. testing, or rerun	yes no yes
arameters for flags for holding samples are defined by more results can be transmitted to LIS while others held	user or vendor yes
cattergram display: cell-specific color istogram display: cell-specific color octobrates display: color with threshhold hoice of desired specimen &/or result info. displayed	yes yes yes
S interface formats supported formation transferred on LIS interface	proprietary numeric & flag results, histograms & scatterplots, instru- ment to LIS; patient demographics, orders, LIS to instru- ment—broadcast
DINC codes transmitted with results ptional data mgmt. or collation system • Software features	yes yes, avail. in 2002; price TBD; proprietary enhanced QC, data archiving, data collation from multiple instruments
terface avail. or planned to auto. specimen-handling system	Lab-Interlink, MDS/Autolab, Beckman Coulter (planned), Roche (planned), Labotix
ar-code symbologies read on tube ccommodates bar-code placement per NCCLS standard Auto2A	<u> </u>
me required for maintenance by lab personnel nboard maintenance records ime from communication of problem to engineer on-site nboard diagnostics/limited to software problems ftr. can perform diagnostics via modem	daily: 30 sec; weekly: 5 min; monthly: 10 min yes avg. <4 hrs yes/no in development
cquisition program based on cost-per-reportable result	yes
istinguishing features	MAPSS cell-by-cell analysis provides a better diff; focused flow 2-dimensional optical RBC & Plt anal. provides better separation betw. microcytic RBCs & large Plts; uses only 3 reagents; 3D MCV

Part 2 of 8		Abbott Diagnostics Steven T. Dethlefsen steven.dethlefsen@abbott.com 100 Abbott Park Rd., Bldg. AP6C-5, Dept. 02KL Abbott Park, IL 60064	Abbott Diagnostics Steven T. Dethlefsen steven.dethlefsen@abbott.com 100 Abbott Park Rd., Bldg. AP6C-5, Dept. 02KL Abbott Park, IL 60064
See related article, pa	nge 38	800-323-9100 ext. 7-8134 www.abbott.com	800-323-9100 ext. 7-8134 www.abbott.com
Name of instrument		Cell-Dyn 3700	Cell-Dyn 4000
First year sold-install No. units installed in l	ed in U.S./outside U.S. U.S./outside U.S./list price	1999/1999 >300/>500/\$180,000 SL Model, \$140,000 CS Model	1997/1997 >350/>500/\$250,000
Test menu:	•Chartable	standard menu (left) plus: RDW, MPV, retic #&%, IRF	standard menu (left) plus: RDW, MPV, NRBC #&%, retic #&%, IRF, CD61
All instruments have: WBC, RBC, Hb, Hct, MCV		, , , , ,	(immuno-Plt), CD 3/4, CD 3/8 (immuno T-cell)
MCH, MCHC, Plt, %&# neut mono, lymph, eos, baso	t,	band, IG, variant lymph, blast, PCT, PDW, NRBC #&% & retic scatter profile	#&% for segs, bands, IG, blasts, variant lymphs; PDW, PCT, white cell viability fraction (WVF)
mono, iympii, coo, bacc	•Flags	suspect populations, band, blast, variant lymph, IG, NRBC, RRBC, NWBC, LRI, URI, LURI, RBC morph., FWBC, high/low interp. message, WBC	band, IG, blast, variant lymph, nvWBC, rstRBC, IR, Plt clump, ASYM, high/low interp. msg., PCT, PDW
FDA-cleared tests but	not clinically released	none	none
	ubmitted for clearance	none	none
For research-use-only	1	none none	none none
Tests unique to analyz	zer	IRF	reportable NRBC #&%, CD61 for Plts, WVF, CD 3/4, CD 3/8 (immuno T-cell)
Differential method(s) Linearity:	•WBC count (10 ⁹ /L)/RBC count (10 ¹² /L)	MAPSS (Multi-Angle Polarized Scatter Sep.) 0-99.9/0-8	Optical scatter & fluorescence technology 0-250/0-7.5
	•Hemoglobin (g/dL)/platelet (109/L)	0-24/0-2,000	1.0-25/0-2,000
Precision:	MCV (fL) or Hct (%) WBC count/RBC count	50–200 (MCV) ≤2.5%/≤1.5%	37–197 (MCV) ≤2.5%/≤1.5%
	Hb/platelet MCV or Hct	≤1.2%/≤5.0% ≤1.0% (MCV)	≤1.0%/≤4.0% ≤1.0% (MCV)
Accuracy of automoto	ed diff. compared with manual diff.,	neut #&%: ≥0.95, lymph #&%: ≥0.94, mono #&%: ≥0.86, eos #&%: ≥0.84,	%neut 0.94, %lymph 0.93, %mono 0.84, %eos 0.91, %baso 0.40,
per NCCLS H-20A Interfering substances		baso #&%: ≥0.73 NRBCs (WIC only), lytic-resistant RBCs, Plt clumps, cryoglobulin and cryofib-	NRBC/WBC 0.91, retic 0.95 lyse-resistant RBCs, Plt clumps
microring substances		rinogen, fragile WBCs	
	•RBC	increased no. giant Plts, auto-agglut, in vitro hemolysis	autoagglutinins, cold agglutinins, hemolysis, small leukocytes (in cases where leukocyte count is high [>100 K/µL] and MCV is high)
	•MCV or Hct	MCV: elevated WBC count, increased no. giant Plts, hyperglycemia, in vitro hemolysis	MCV: in vitro hemolysis, auto- & cold agglutinins, hyperglycemia, leukocytosis with macrocy. anemia
	•Platelet	WBC fragments, in vitro hemolysis, microcytic RBCs, cryoglobulin, Plt	Plt clumps, WBC & RBC fragments, microcytic RBCs, auto- & cold
	•Hb	clumps, increased no. giant Plts increased plasma substances (triglycerides, bilirubin, in vivo hemolysis),	agglutinins, PIt satellitosis high lipids (>700 mg/dL), high WBCs (>250 K/μL, based on concentrated,
Interfering substances	s: differential	lytic-resistant RBCs n/a	normal WBCs), high bilirubin (>33 mg/dL) n/a
Age- and sex-specific	reference ranges	yes	yes
Max. CBCs per hr/max Recommended avg. fr	x. CBCs & diffs. per hr requency of calib.	90/90 6 mos	106/106 6 mos verification
Modes calibrated.	/parameters calibrated	open & closed/WBC, RBC, Hb, MCV, Plt	open-closed one proc./WBC, RBC, Hb, MCV, Plt, MPV
Frequency of blood/la Min. specimen vol. op	tex controls en/closed/sample dead vol. closed	2 levels every 8 hrs/n/a 130 μL/355 μL/1.0 mL	2 levels every 8 hrs/n/a 112.5 µL-aspir. vol./same/387 µL-dead vol.
Tube sampling suppor		yes (13x75 mm)	yes
Veterinary capability Microsample capability		yes yes	no yes (250 µL) in Sarstedt Multivette & Becton Dickinson Microtainer tubes
Prepares microscopic problems for slide p	s slides automatically or flags prep	yes (flags only)	yes (flags only)
If auto. slidemaker av	rail., no. installed/list price	80/\$125,000	80/\$125,000
Archives patient data Patient-specific archiv		yes yes	yes yes
Max. archived data ac	ccessible when system online	10,000 results	10,000 results
	umeric results–no. specimens sto/cytograms–no. specimens	10,000 results 10,000 results	10,000 results 10,000 results
 Stored in conjunct 	tion with CBC data	yes	yes
	nages & CBC data printed as 1 report recalled and retransmitted	yes yes	yes yes
Saved data can be sort Performs delta checks	ted for reprocessing or report transmission	yes no	yes yes
Tags and holds result	s for followup, confirm. testing, or rerun	yes	yes
	for holding samples are defined by transmitted to LIS while others held	user or vendor yes	user or vendor yes
Scattergram display:	cell-specific color	yes	yes
Histogram display: co Choice of desired spe	lor with threshhold cimen &/or result info. displayed	yes yes	yes yes
LIS interface formats		proprietary	proprietary
Information transferre	ed on LIS interface	numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast	num. & flag results, histograms & scatterplots, inst. to LIS; patient demographics, orders, LIS to inst.—broadcast; host query for demographics &
LOINC codes transmit		yes	orders yes
Optional data mgmt. o • Software features		yes, available in 2002; price TBD; proprietary enhanced QC, data archiving, data collation from multiple instruments	yes, available in 2002; price TBD; proprietary enhanced QC, data archiving, data collation from multiple instruments
	nned to auto. specimen-handling system	Lab-Interlink (planned), MDS/AutoLab, Beckman Coulter (planned), Roche	Lab-Interlink, MDS/AutoLab, Beckman Coulter (planned), Roche
Bar-code symbologies Accommodates bar-co	s read on tube de placement per NCCLS standard Auto2A	(planned), Labotix (planned) Codabar, codes 39 & 128, interl. 2 of 5 yes	(planned), Labotix (planned) Codabar, codes 39 & 128, interl. 2 of 5 yes
	intenance by lab personnel	daily: 30 sec; bi-weekly: 5 min; monthly: 10 min	daily: 30 sec; weekly: 5 min; monthly: 10 min
Onboard maintenance Time from communica	e records ation of problem to engineer on-site	yes avg. <4 hrs	yes avg. <4 hrs
Onboard diagnostics/l	limited to software problems	yes/no	yes/no
Mftr. can perform diag		in development	in development
	pased on cost-per-reportable result	yes	yes
Distinguishing feature	es	MAPSS cell-by-cell analysis provides a better diff; retic with reportable IRF (immature retic. fraction); 60-species veterinary package	reportable NRBC count, monoclonal antibody capability, fluoresc. random access retic w/ reportable IRF, WBC viability index, Argon laser

December 2001 CAP TODAY / 41

		ABX Diagnostics Inc.	ABX Diagnostics Inc.
Part 3 of 8		Jim Mulry jmulry@us.abx.fr	Jim Mulry jmulry@us.abx.fr
		34 Bunsen	34 Bunsen
		Irvine, CA 92618	Irvine, CA 92618
See related article, p	age 38	888-903-5001 x 259 www.abx.fr	888-903-5001 x 259 www.abx.fr
Name of instrument		Pontra 60c+ Homatology Analyzor	Pontra 120 Potio Homatology Analyzor
	lled in U.S./outside U.S.	Pentra 60°+ Hematology Analyzer 2000/2000	Pentra 120 Retic Hematology Analyzer 1999/1997
_	U.S./outside U.S./list price	100/300/\$49,500	18/550/\$125,000
	olo, outolde olo, not prioc	130/000/ψ10,000	10/000/ψ120,000
Test menu:	Chartable	standard menu (left) plus: RDW, MPV	standard menu (left) plus: RDW, RTC, IRF, MPV
All instruments have:		,	, , ,
WBC, RBC, Hb, Hct, MC	cy, •Laboratory	atyp. lymph, atyp. lymph %, LIC, LIC %	LIC, atyp. lymph, PCT, PDW, CRC%
MCH, MCHC, PIt, %&# ner			, , , , , , , , , , , , , , , ,
mono, lymph, eos, baso	•Flags	complete operator selectable flagging	82 quantitative & qualitative flags
FDA alasmada ata bu	A was alkala dha wala a a d		
	it not clinically released	none	none
	submitted for clearance	none	none
Tests in developmen		none	none
For research-use-on		none	none
Tests unique to analy	yz c i	none	none
Differential method(s	s) used	DHSS technology combining cytochemistry, focused flow impedance, &	cytochemistry, focused flow impedance, light absorbence
Dinoroniaa moaroa(c	,, 4004	light absorbance principles of measurement	oytoonomou y, roottoot non impottanoo, ngin aboorbonoo
Linearity:	•WBC count (109/L)/RBC count (1012/L)	0.1-90/0.5-8.1	0.1-85/0.5-8.1
,	•Hemoglobin (g/dL)/platelet (109/L)	2.5–23/10–1,000	2–25/10–1,000
	•MCV (fL) or Hct (%)	10–70 (Hct)	10–70 (Hct)
Precision:	•WBC count/RBC count	<2%/<2%	3%/2%
	•Hb/platelet	<1%/<5%	2%/5%
	•MCV or Hct	<1% (Hct)	2% (Hct)
		` '	. ,
Accuracy of automat	ted diff. compared with manual diff.,	neut 0.9997, lymph 0.9897, mono 0.9645, eos 0.8910, baso 0.5490	neut 0.99, lymph 0.99, mono 0.92, eos 0.97, baso 0.71
per NCCLS H-20A	• /		, , , , ,
Interfering substance	es:∙WBC	NRBCs, Plt clumps, large Plts, lyse-resistant RBCs	unlysed RBCs, NRBCs, cryoglob.
	•RBC	cold agglut, Plt clumps, WBC overlinearity	cold agglut, agglut RBCs
	•MCV or Hct	lipemic samples, high WBC, lipemic specimens, aggluts	RBC agglut, large Plts
	•Platelet	RBC & WBC frags	giant Plts, microcytes, Plt agglut
	•Hb	lipemia, high WBC	elevated WBC, elevated lipids
Interfering substance	es: differential	NRBC, resistant RBCs, lipemia	lyse-resistant RBCs
Age- and sex-specifi	<u> </u>	yes	yes
•	ax. CBCs & diffs. per hr	60/60	120/120
Recommended avg. 1		6 months	with major PM or part replacement
	d/parameters calibrated	open/WBC, RBC, Hb, MCV, PCT	open by cust., others by svc./WBC, RBC, Hb, Hct, Plt
Frequency of blood/l		daily/none	per CLIA standards/not required
	pen/closed/sample dead vol. closed	53 μL/53 μL/0.5 mL	130 μL/200 μL/1 mL
Tube sampling suppo		yes (multiple sizes)	yes
Veterinary capability		yes	yes
Microsample capabil		no	yes
	c slides automatically or flags	no	yes
problems for slide	vail., no. installed/list price		avail. May 2002/list price \$40,000
ii auto. Siluciliakci a	van., no. mstaneu/nst price		avaii. may 2002/113t price \$40,000
Archives natient data	a for later comparison	yes	yes
Patient-specific arch		no	yes
	ccessible when system online	_	90,000
	numeric results-no. specimens	10,000	90,000
	iisto/cytograms-no. specimens	10,000	90,000
	ction with CBC data	yes	_
	mages & CBC data printed as 1 report	yes	_
	recalled and retransmitted	yes	yes
		yes	yes
	orted for reprocessing or report transmission		
		yes	yes
Saved data can be so Performs delta check			yes yes
Saved data can be so Performs delta check Tags and holds resul	KS	yes	
Saved data can be so Performs delta check Tags and holds resul Parameters for flags	ks Its for followup, confirm. testing, or rerun	yes yes	yes
Saved data can be so Performs delta check Tags and holds resul Parameters for flags	ks Its for followup, confirm. testing, or rerun for holding samples are defined by transmitted to LIS while others held	yes yes user	yes user
Saved data can be so Performs delta check Tags and holds resul Parameters for flags Some results can be Scattergram display: Histogram display: ca	ks Its for followup, confirm. testing, or rerun for holding samples are defined by transmitted to LIS while others held cell-specific color olor with threshhold	yes yes user yes	yes user yes (operator programmable)
Saved data can be so Performs delta check Tags and holds resul Parameters for flags Some results can be Scattergram display: Histogram display: co	ks Its for followup, confirm. testing, or rerun for holding samples are defined by transmitted to LIS while others held cell-specific color	yes yes user yes no	yes user yes (operator programmable) no
Saved data can be so Performs delta check Tags and holds resul Parameters for flags Some results can be Scattergram display: Histogram display: co Choice of desired spo	ks Its for followup, confirm. testing, or rerun for holding samples are defined by transmitted to LIS while others held cell-specific color olor with threshhold ecimen &/or result info. displayed	yes yes user yes no	yes user yes (operator programmable) no yes
Saved data can be so Performs delta check Tags and holds resul Parameters for flags Some results can be Scattergram display: Histogram display: co Choice of desired spo	Its for followup, confirm. testing, or rerun for holding samples are defined by transmitted to LIS while others held cell-specific color olor with threshhold ecimen &/or result info. displayed	yes yes user yes no yes — ASTM 1394 & 1238, HL7, IEEE MIB	yes user yes (operator programmable) no yes yes proprietary, ASTM 1394 & 1238, HL7, IEEE MIB
Saved data can be so Performs delta check Tags and holds resul Parameters for flags Some results can be Scattergram display: Histogram display: co Choice of desired spo	Its for followup, confirm. testing, or rerun for holding samples are defined by transmitted to LIS while others held cell-specific color olor with threshhold ecimen &/or result info. displayed	yes yes user yes no yes — ASTM 1394 & 1238, HL7, IEEE MIB numeric & flag results, histograms & scatterplots, instrument to LIS;	yes user yes (operator programmable) no yes yes proprietary, ASTM 1394 & 1238, HL7, IEEE MIB num. & flag results, histograms & scatterplots, instr. to LIS; patient
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		Bayer Diagnostics	Bayer Diagnostics
Part 4 of 8		Nancy Lavon nancy.lavon.b@bayer.com 555 White Plains Rd., Tarrytown, NY 10591	Nancy Lavon nancy.lavon.b@bayer.com 555 White Plains Rd., Tarrytown, NY 10591
		800-431-1970	800-431-1970
See related article, p	page 38	www.bayerdiag.com	www.bayerdiag.com
,,			
Name of instrument		Advia 120 Hematology System	Advia 70
	alled in U.S./outside U.S. n U.S./outside U.S./list price	1998/1998 600/2,500/\$169,000-\$189,000	2001/2001
No. units instancu in	1 0.3./outside 0.3./list price	000/2,300/\$109,000-\$109,000	//\$89,000
Test menu:	Chartable	standard menu (left) plus: CHCM, MPV, RDW, HDW, LUC %&#, retic %&#,</td><td>standard menu (left) plus: RDW, MPV</td></tr><tr><td>All instruments have:</td><td></td><td>CHr, CHCMr, MCVr</td><td></td></tr><tr><td>WBC, RBC, Hb, Hct, MC MCH, MCHC, Plt, %&# ne</td><td>CV,</td><td>0/ I I II III III</td><td></td></tr><tr><td>mono, lymph, eos, baso</td><td>•ut, •Laboratory</td><td>%: hypo, hyper, macro, micro; calc. Hb, MPXI; %: blasts, PMN, MN; large Plt count; RBC frag. count; RBC ghost count</td><td>none</td></tr><tr><td></td><td></td><td>70. Didott, 1 mili, mili, miligo i it obaint, fibo mag. obaint, fibo gnost obaint</td><td></td></tr><tr><td></td><td>•Flags</td><td>left shift, atyp. lymph, blasts, immature grans, myeloperox. deficiency,</td><td>diff., WBC, N, B, L, RBC, ABN, PL, CI, PIt/RBC</td></tr><tr><td></td><td></td><td>aniso, micro, macro, Hb variation, hypo, hyper, NRBC, RBC frag., RBC</td><td></td></tr><tr><td></td><td></td><td>ghost, large Plt, Plt clumps</td><td></td></tr><tr><td>FDA-cleared tests bu</td><td>ut not clinically released</td><td>none</td><td>_</td></tr><tr><td>Tests not avail. but s</td><td>submitted for clearance</td><td>none</td><td>_</td></tr><tr><td>Tests in developmen</td><td></td><td>IRF, MPC, MPM</td><td>— D. I. DDW</td></tr><tr><td>For research-use-on Tests unique to anal</td><td></td><td>none CHCM, HDW, CHr, CHCMr, MPC, MPM</td><td>Pct, PDW</td></tr><tr><td>resis unique to anai</td><td></td><td>CHOM, HDW, CHI, CHOMI, MFC, MFM</td><td></td></tr><tr><td>Differential method(s</td><td>(s) used</td><td>perox-peroxidase cytochem. staining w/ light scatter & absorption;</td><td>optical & enhanced impedance</td></tr><tr><td></td><td></td><td>baso-cytochem. stripping with 2-angle laser light scatter</td><td></td></tr><tr><td>Lincority</td><td>•WPC count (109/L)/PPC count (1012/L)</td><td>0.02-400/0-7.0</td><td>0.1-99/0.02-9.99</td></tr><tr><td>Linearity:</td><td>WBC count (109/L)/RBC count (1012/L) Hemoglobin (g/dL)/platelet (109/L)</td><td>0.02-400/0-7.0 0-22.5 /5-3,500</td><td>0.1-99/0.02-9.99 1.5-30/10-2,000</td></tr><tr><td></td><td>•MCV (fL) or Hct (%)</td><td>30–180 (MCV)</td><td>30–150 (MCV)</td></tr><tr><td>Precision:</td><td>WBC count/RBC count</td><td>2.7%/1.2%</td><td>2.0%/1.2%</td></tr><tr><td></td><td>•Hb/platelet</td><td>0.93%/2.93%</td><td>1.0%/3–10%</td></tr><tr><td>Accuracy of automot</td><td>MCV or Hct ted diff. compared with manual diff.,</td><td>0.78% (MCV) neut 0.997r, lymph 0.997r, mono 0.943r, eos 0.979r, baso 0.772r, luc</td><td>1.0% (MCV) neut% r>0.9, lymph% r>0.9, mono% >0.7, eos% r>0.8, baso% >0.5</td></tr><tr><td>per NCCLS H-20A</td><td>neu am. compareu wim manuai am.,</td><td>0.944r</td><td>neut% r>0.9, tympn% r>0.9, mono% >0.7, eos% r>0.6, baso% >0.5</td></tr><tr><td>por modeo il Zon</td><td></td><td></td><td></td></tr><tr><td>Interfering substance</td><td></td><td>incomplete RBC lysis (perox only)</td><td>incomplete RBC lysis</td></tr><tr><td></td><td>•RBC</td><td>cold agglut, extreme sickle cell</td><td>cold agglutinins</td></tr><tr><td></td><td>•MCV or Hct</td><td>none</td><td>extremely high white blood cell count (HCT)</td></tr><tr><td></td><td>Platelet</td><td>none</td><td>RBC fragments</td></tr><tr><td></td><td>•Hb</td><td>high WBC, lip., extremely high bili., interfere w/ cyanmethb only, none w/</td><td>lipemia, elevated WBC</td></tr><tr><td></td><td></td><td>direct cellular Hb (CHCM)</td><td></td></tr><tr><td>Interfering substance</td><td>es: differential</td><td>incomplete lysis of RBCs, complete myeloperox. def.</td><td>NRBCs, unlysed RBC, platelet clumps</td></tr><tr><td>Age- and sex-specifi</td><td>fic reference ranges</td><td>yes</td><td>yes</td></tr><tr><td></td><td>ax. CBCs & diffs. per hr</td><td>120/120</td><td>70/70</td></tr><tr><td>Recommended avg.</td><td>frequency of calib.</td><td>6 mos</td><td>every 6 mos per governmental requirements</td></tr><tr><td></td><td>ed/parameters calibrated</td><td>open, closed, autosampler/all measured params</td><td>open & closed/all measured parameters</td></tr><tr><td>Frequency of blood/l</td><td>latex controls open/closed/sample dead vol. closed</td><td>once per shift/not required 157 μL/157 μL/<300 μL (tube size dependent)</td><td>one level per shift/not required 90 µL/180 µL/120 µL</td></tr><tr><td>Tube sampling supp</td><td></td><td>yes (2, 3, 5, 7 mL—all sizes–open tube)</td><td>yes (12x75)</td></tr><tr><td>Veterinary capability</td><td></td><td>yes</td><td>no</td></tr><tr><td>Microsample capabi</td><td>-</td><td>yes</td><td>yes</td></tr><tr><td>prepares microscopi problems for slide</td><td>ic slides automatically or flags</td><td>yes</td><td>yes</td></tr><tr><td>-</td><td>avail., no. installed/list price</td><td>n/a</td><td>Advia 560, just released/\$35,000</td></tr><tr><td></td><td>,</td><td></td><td></td></tr><tr><td></td><td>a for later comparison</td><td>yes</td><td>yes</td></tr><tr><td>Patient-specific arch</td><td></td><td>10 000 complex</td><td>yes 100,000</td></tr><tr><td></td><td>accessible when system online numeric results–no. specimens</td><td>10,000 samples 10,000</td><td>100,000 100,000</td></tr><tr><td></td><td>histo/cytograms-no. specimens</td><td>10,000</td><td>100,000</td></tr><tr><td>•Stored in conjunc</td><td>ction with CBC data</td><td>yes</td><td>yes</td></tr><tr><td></td><td>images & CBC data printed as 1 report</td><td>yes</td><td>yes</td></tr><tr><td></td><td>e recalled and retransmitted corted for reprocessing or report transmission</td><td>yes ves</td><td>yes ves</td></tr><tr><td>Performs delta chec</td><td></td><td>yes yes</td><td>yes no</td></tr><tr><td>Tags and holds resu</td><td>ılts for followup, confirm. testing, or rerun</td><td>yes</td><td>yes</td></tr><tr><td></td><td>s for holding samples are defined by</td><td>user or vendor</td><td>user</td></tr><tr><td>Some results can be Scattergram displays</td><td>e transmitted to LIS while others held</td><td>yes</td><td>all results for that sample are transmitted at once</td></tr><tr><td></td><td>clor with threshhold</td><td>yes yes</td><td>yes yes</td></tr><tr><td></td><td>pecimen &/or result info. displayed</td><td>yes</td><td>yes</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>LIS interface formats</td><td></td><td>proprietary (Spec 79)</td><td>proprietary, ASTM 1394, E 1381</td></tr><tr><td>Information transfer</td><td>reu dii Lio iiilertace</td><td>num. & flag results, histograms & scatterplots, instr. to LIS; patient demographics, orders, LIS to instr.— broadcast; host query for demograph-</td><td>num. & flag results, instr. to LIS; patient demographics, patient orders, LIS to instr.— broadcast</td></tr><tr><td></td><td></td><td>ics & orders</td><td></td></tr><tr><td>LOINC codes transm</td><td></td><td>no</td><td>_</td></tr><tr><td>Optional data mgmt.</td><td></td><td>in development</td><td>in development</td></tr><tr><td>Software feature Interface avail, or plants</td><td>es lanned to auto. specimen-handling system</td><td>MXS (Japan), LabCell (Bayer)</td><td></td></tr><tr><td>Bar-code symbologic</td><td></td><td>Codabar, codes 39 & 128, ASTM, interl. 2 of 5</td><td>Codabar, code 39, interl. 2 of 5</td></tr><tr><td>, ,</td><td>code placement per NCCLS standard Auto2A</td><td>yes</td><td>yes</td></tr><tr><td>Time required (</td><td>aintananaa hy lab maraanaal</td><td>doily 15 min weekly 15 min weath 45 min</td><td>daily 0 wookly 0 monthly 00 min</td></tr><tr><td>Time required for ma Onboard maintenance</td><td>aintenance by lab personnel ce records</td><td>daily: 15 min; weekly: 15 min; monthly: 15 min yes</td><td>daily: 0; weekly: 0; monthly: 20 min yes</td></tr><tr><td></td><td>ication of problem to engineer on-site</td><td>territory dependent</td><td>territory dependent</td></tr><tr><td>Onboard diagnostics</td><td>s/limited to software problems</td><td>yes/no</td><td>yes/no</td></tr><tr><td></td><td>iagnostics via modem</td><td>yes</td><td>in development</td></tr><tr><td>Mftr. can perform di</td><td>. 3</td><td></td><td></td></tr><tr><td></td><td></td><td>201</td><td>200</td></tr><tr><td></td><td>ı based on cost-per-reportable result</td><td>yes</td><td>yes</td></tr><tr><td></td><td>based on cost-per-reportable result</td><td>unique laser technology provides cellular Hb for RBCs & retics; 2-</td><td>microsampling; auto recount; dual WBCs; automatic wakeup &</td></tr><tr><td>Acquisition program</td><td>based on cost-per-reportable result</td><td>unique laser technology provides cellular Hb for RBCs & retics; 2- dimensional Plt analysis that eliminates interference from RBC</td><td></td></tr><tr><td>Acquisition program</td><td>based on cost-per-reportable result</td><td>unique laser technology provides cellular Hb for RBCs & retics; 2-</td><td>microsampling; auto recount; dual WBCs; automatic wakeup &</td></tr></tbody></table>	

2 /5 /0		Beckman Coulter Inc.	Beckman Coulter Inc.
Part 5 of 8		Martha M. Diaz/Cellular Analysis Marketing 200 S. Kraemer Blvd., Brea, CA 92822-8000	Martha M. Diaz/Cellular Analysis Marketing 200 S. Kraemer Blvd., Brea, CA 92822-8000
		714-993-8847	714-993-8847
See related article, pa	age 38	www.beckmancoulter.com	www.beckmancoulter.com
Name of instrument	lad in H.C. /autaida H.C.	Coulter LH 700 Series	Coulter GEN•S System
	led in U.S./outside U.S. U.S./outside U.S./list price	2001 —/—/LH 750: \$195,000; LH 755: \$367,500	1996 >1,100/>2,000/\$177,500; w/ SlideMaker-stainer, \$327,000
No. units instance in	0.3./ Outside 0.3./ list price	—/—/LII /30. \$193,000, LII /33. \$307,300	>1,100/>2,000/\$177,500, W/ SildeWaker-Stallier, \$527,000
Test menu:	Chartable	standard menu (left) plus: RDW, MPV, retic #&%, IRF, MPV, graded RBC	standard menu (left) plus: RDW, MPV, retic #&%, graded RBC morph., MRV,
All instruments have:		morph, NRBC %&#/100 WBC	IRF
WBC, RBC, Hb, Hct, MCN MCH, MCHC, Plt, %&# neu</td><td>v, •Laboratory</td><td>PCT, PDW</td><td>PCT, PDW</td></tr><tr><td>mono, lymph, eos, baso</td><td>Flags</td><td>user-definable age-, gender-, &/or location-based ref.; intervals, action & critical limits; user-def. RBC morph.; gradient msgs. (=+, ++, +++); user-</td><td>user-definable age-, gender- &/or location-based ref. intervals, action & critical limits; user-def. RBC morph. gradient msgs. (=+, ++, +++); user-</td></tr><tr><td></td><td></td><td>selectable sensitivity for diff abnormal pop, suspect messages</td><td>selectable sensitivity for diff abnormal pop. suspect msgs.</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td>t not clinically released</td><td>none</td><td>none</td></tr><tr><td>Tests not avail. but su</td><td>ubmitted for clearance</td><td>none none</td><td>none</td></tr><tr><td>For research-use-only</td><td></td><td>high light scatter retics, mean spherical cell vol.</td><td>high light scatter retics, mean spherical cell vol.</td></tr><tr><td>Tests unique to analy</td><td></td><td>NRBC, mean spherical cell vol.</td><td>mean spherical cell vol.</td></tr><tr><td>Differential mathematical</td><td>\d</td><td>Outlieds O. D. 1000 Assistant and Assistant Assistant Assistant Assistant</td><td>Outlied O D 1000 to be about on A conflored about on the USE of the</td></tr><tr><td>Differential method(s)</td><td>) usea</td><td>Coulter's 3-D VCS technology, AccuCount technology, AccuFlex technolo- qy w/ IntelliKinetics & AccuGate</td><td>Coulter's 3-D VCS technology, AccuFlex technology w/ IntelliKinetics & AccuGate</td></tr><tr><td></td><td></td><td>yy w/ intellialieus a Accudate</td><td>Accudate</td></tr><tr><td>Linearity:</td><td>•WBC count (109/L)/RBC count (1012/L)</td><td>0-400/0-8.0</td><td>0-140/0-8.0</td></tr><tr><td></td><td>•Hemoglobin (g/dL)/platelet (109/L)</td><td>0-25/0-3,000</td><td>0-25/0-1,500</td></tr><tr><td>Propinion-</td><td>•MCV (fL) or Hct (%)</td><td>50–200 (MCV)</td><td>50–200 (MCV)</td></tr><tr><td>Precision:</td><td>WBC count/RBC count Hb/platelet</td><td><1.7%/<0.8% <0.8%/<3.3%</td><td><1.7%/<0.8% <0.8%/<3.3%</td></tr><tr><td></td><td>•MCV or Hct</td><td><0.8% (MCV)</td><td><0.8% (MCV)</td></tr><tr><td></td><td>ed diff. compared with manual diff.,</td><td>lymph%= $\pm 1.5\%$, neut%= $\pm 2.0\%$, mono%= $\pm 1.0\%$, eos%= $\pm 0.5\%$, baso%=</td><td>lymph%= $\pm 3.0\%$, mono%= $\pm 2.0\%$, neut%= $\pm 3.0\%$, eos%= $\pm 1.0\%$, baso%=</td></tr><tr><td>per NCCLS H-20A</td><td></td><td>±0.5%</td><td>±1.0%</td></tr><tr><td>Interfering substance</td><td>es:•WBC</td><td>unusual RBC abnormalities that resist lysing, NRBC, frag. WBC, unlysed</td><td>unusual RBC abnormalities that resist lysing, NRBC, frag. WBC, unlysed</td></tr><tr><td></td><td>•RBC</td><td>particle >35 fL, large Plt very high WBC, high conc. large Plt, autoagglutinins</td><td>particle >35 fL, large Plt very high WBC, high conc. large Plt, autoagglutinins</td></tr><tr><td></td><td>•MCV or Hct</td><td>MCV & Hct: very high WBC, high conc. large Plt, autoagglutinins</td><td>MCV & Hct: very high WBC, high conc. large PIt, autoagglutinins</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td>•Platelet</td><td>very small RBCs & WBC frags. may interfere; chemotherapy may affect</td><td>very small RBCs & WBC frags. may cause no-fit; chemotherapy may affect</td></tr><tr><td></td><td>•Hb</td><td>certain samples. very high WBC, severe lipemia, heparin, rare lyse-resistant RBCs</td><td>certain samples very high WBC, severe lipemia, heparin, rare lyse-resistant RBCs</td></tr><tr><td>Interfering substance</td><td></td><td>high triglycerides may affect lysing</td><td>high triglycerides may affect lysing</td></tr><tr><td>J</td><td></td><td>3 - 3,</td><td>3 - 37</td></tr><tr><td>Age- and sex-specific</td><td><u> </u></td><td>yes</td><td>yes</td></tr><tr><td>Max. CBCs per hr/ma Recommended avg. fi</td><td>x. CBCs & diffs. per hr</td><td>105/105</td><td>105/105</td></tr><tr><td></td><td>requency of camb. I/parameters calibrated</td><td>2 times/yr primary/RBC, WBC, Hb, MCV, Plt, MPV</td><td>2 times/yr primary/RBC, WBC, Hb, MCV, Plt, MPV</td></tr><tr><td>Frequency of blood/la</td><td></td><td>once per shift/once per day</td><td>once per shift/once per day</td></tr><tr><td></td><td>oen/closed/sample dead vol. closed</td><td>200 μL/300 μL/550 μL with Slidemaker/1.0 mL</td><td>200 μL/300 μL/550 μL with SlideMaker/1.0 mL</td></tr><tr><td>Tube sampling suppo</td><td>orted</td><td>yes (multiple sizes & styles)</td><td>yes (multiple sizes & styles)</td></tr><tr><td>Veterinary capability Microsample capabili</td><td>itu</td><td>no voc</td><td>NO NOS</td></tr><tr><td>1</td><td>s slides automatically or flags</td><td>yes yes, both</td><td>yes yes, both</td></tr><tr><td>problems for slide p</td><td></td><td></td><td>• •</td></tr><tr><td>If auto. slidemaker av</td><td>vail., no. installed/list price</td><td>>100 U.S./\$175,000</td><td>>100 U.S./\$175,000</td></tr><tr><td>Archives patient data</td><td>for later comparison</td><td>yes</td><td>yes</td></tr><tr><td>Patient-specific archi</td><td></td><td>yes</td><td>yes</td></tr><tr><td>Max. archived data a</td><td>ccessible when system online</td><td>20,000 samples</td><td>20,000 samples</td></tr><tr><td></td><td>umeric results-no. specimens</td><td>20,000</td><td>20,000</td></tr><tr><td>Memory capacity—hi •Stored in conjunct</td><td>isto/cytograms-no. specimens</td><td>5,000</td><td>5,000</td></tr><tr><td></td><td>nages & CBC data printed as 1 report</td><td>yes yes</td><td>yes yes</td></tr><tr><td>, ,</td><td>recalled and retransmitted</td><td>yes</td><td>yes</td></tr><tr><td></td><td>rted for reprocessing or report transmission</td><td>yes</td><td>yes</td></tr><tr><td>Performs delta check</td><td></td><td>yes</td><td>yes</td></tr><tr><td></td><td>ts for followup, confirm. testing, or rerun for holding samples are defined by</td><td>yes user or vendor</td><td>yes User or vendor</td></tr><tr><td>Some results can be</td><td></td><td></td><td>yes</td></tr><tr><td></td><td>transmitted to Lib wille others held</td><td>yes</td><td>) oo</td></tr><tr><td>Scattergram display:</td><td>cell-specific color</td><td>yes</td><td>yes</td></tr><tr><td>Histogram display: co</td><td>cell-specific color olor with threshhold</td><td>yes yes</td><td>yes yes</td></tr><tr><td>Histogram display: co</td><td>cell-specific color</td><td>yes</td><td>yes</td></tr><tr><td>Histogram display: co Choice of desired spe</td><td>cell-specific color olor with threshhold ecimen &/or result info. displayed</td><td>yes yes yes</td><td>yes yes yes</td></tr><tr><td>Histogram display: co</td><td>cell-specific color olor with threshhold ecimen &/or result info. displayed</td><td>yes yes</td><td>yes yes</td></tr><tr><td>Histogram display: co Choice of desired spe</td><td>cell-specific color olor with threshhold ecimen &/or result info. displayed supported</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferre</td><td>cell-specific color plor with threshhold ecimen &/or result info. displayed supported ed on LIS interface</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferre LOINC codes transmit</td><td>cell-specific color plor with threshhold ecimen &/or result info. displayed supported ed on LIS interface tted with results</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferre</td><td>cell-specific color plor with threshhold ecimen &/or result info. displayed supported ed on LIS interface tted with results or collation system</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferro LOINC codes transmit Optional data mgmt. o</td><td>cell-specific color plor with threshhold ecimen &/or result info. displayed supported ed on LIS interface tted with results or collation system</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes enhanced QC, data archiving, common database, extensive decision rules, delta checking</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferro LOINC codes transmit Optional data mgmt. o Software features</td><td>cell-specific color plor with threshhold ecimen &/or result info. displayed supported ed on LIS interface tted with results or collation system</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes enhanced QC, data archiving, common database, extensive decision rules,</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes enhanced QC, data archiving, common database, extensive decision rules,</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferre LOINC codes transmit Optional data mgmt. o Software features Interface avail. or pla</td><td>cell-specific color color with threshhold ecimen &/or result info. displayed supported ed on LIS interface tted with results or collation system s unned to auto. specimen-handling system</td><td>yes yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes enhanced QC, data archiving, common database, extensive decision rules, delta checking Beckman Coulter</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes enhanced QC, data archiving, common database, extensive decision rules, delta checking Beckman Coulter</td></tr><tr><td>Histogram display: co Choice of desired spe LIS interface formats Information transferre LOINC codes transmit Optional data mgmt. • Software features Interface avail. or pla Bar-code symbologies</td><td>cell-specific color color with threshhold ecimen &/or result info. displayed supported ed on LIS interface tted with results or collation system s unned to auto. specimen-handling system s read on tube</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast no yes enhanced QC, data archiving, common database, extensive decision rules, delta checking</td><td>yes yes yes proprietary numeric & flag results, histograms & scatterplots, instrument to LIS; 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	Part 6 of 8		Beckman Coulter Inc. Martha M. Diaz/Cellular Analysis Marketing 200 S. Kraemer Blvd., Brea, CA 92822-8000 714-993-8847	Beckman Coulter Inc. Martha M. Diaz/Cellular Analysis Marketing 200 S. Kraemer Blvd., Brea, CA 92822-8000 714-993-8847
	See related article, pa	ge 38	www.beckmancoulter.com	www.beckmancoulter.com
	Name of instrument First year sold–install No. units installed in U	ed in U.S./outside U.S. J.S./outside U.S./list price	Coulter HmX 1999 HmX AL, 1999 HmX CP >100/>250/\$135,000 AL; \$120,000 CP	Coulter MAXM with Reticulocytes 1991 MAXM; 1992 MAXM AL >2,100/2,400/MAXM with retics \$90,000; MAXM AL with retics \$105,000
	Test menu:	•Chartable	standard menu (left) plus: RDW, MPV, retic #&%, graded RBC morph., IRF, MRV	standard menu (left) plus: RDW, MPV, retic #&%, graded RBC morph.
	All instruments have: WBC, RBC, Hb, Hct, MCV	y, •Laboratory	PCT, PDW	PCT, PDW
	MCH, MCHC, Plt, %&# neut mono, lymph, eos, baso	•Flags	comprehensive high/low, definitive & suspect messages	comprehensive high/low, definitive & suspect messages
	FDA-cleared tests but	not clinically released	none	none
	Tests not avail. but su Tests in development	-	none none	none none
	For research-use-only		none	mean retic vol., maturation index
-	Tests unique to analyz		none	none
	Differential method(s)	used	Coulter's 3-D VCS technology	Coulter's 3-D VCS technology
	Linearity:	•WBC count (109/L)/RBC count (1012/L) •Hemoglobin (g/dL)/platelet (109/L)	0-99.9/0-7.0 0-25/0-999	0-99.9/0-7.0 0-25/0-999
		•MCV (fL) or Hct (%)	50–150 (MCV)	50–150 (MCV)
ı	Precision:	WBC count/RBC count Hb/platelet	<2.5%/<2.0% <1.5%/<5.0%	<2.5%/<2.0% <1.5%/<5.0%
		•MCV or Hct	<2.0% (MCV)	<2.0% (MCV)
	Accuracy of automate per NCCLS H-20A	d diff. compared with manual diff.,	lymph%= $\pm 3.0\%$, mono%= $\pm 2.0\%$, neut%= $\pm 3.0\%$, eos%= $\pm 1.0\%$, baso%= $\pm 1.0\%$	lymph%= $\pm 3.0\%$, mono%= $\pm 2.0\%$, neut%= $\pm 3.0\%$, eos%= $\pm 1.0\%$, baso%= $\pm 1.0\%$
	Interfering substances	s:•WBC	unusual RBC abnormalities that resist lysing, NRBC, frag. WBC, unlysed particle $>$ 35 fL, large Plt	unusual RBC abnormalities that resist lysing, NRBC, frag. WBC, unlysed particle $>\!35~\mathrm{fL}$, large PIt
		•RBC •MCV or Hct	very high WBC, high conc. of very large Plt, autoagglutinins MCV & Hct: very high WBC, high conc. of large Plt, autoagglutinins	very high WBC, high conc. of very large Plt, autoagglutinins MCV & Hct: very high WBC, high conc. of large Plt, autoagglutinins
		•Platelet	very small RBCs & WBC frags. may cause no-fit; chemotherapy may affect	very small RBCs & WBC frags. may cause no-fit; chemotherapy may affect
		•Hb	certain samples very high WBC, severe lipemia, heparin, rare lyse-resistant RBCs	certain samples very high WBC, severe lipemia, heparin, rare lyse-resistant RBCs
	Interfering substances	s: differential	high triglycerides may affect lysing	high triglycerides may affect lysing
ŀ	Age- and sex-specific	reference ranges	gender-specific printout	gender-specific printout
	Max. CBCs per hr/max	k. CBCs & diffs. per hr	75/75	75/75
	Recommended avg. fr		2 times/yr	4 times/yr
	Frequency of blood/la	/parameters calibrated tex controls	primary/RBC, WBC, Hb, MCV, Plt, MPV once per shift/once per day	primary/RBC, WBC, Hb, MCV, Plt, MPV once per shift/once per day
ı		en/closed/sample dead vol. closed	125 µL/185 µL/50 µL predilute/0.5 mL	125 µL/185 µL/50 µL predilute/0.5 mL
ı	Tube sampling suppor	rted	yes (multiple sizes & styles)	yes (multiple sizes & styles)
ı	Veterinary capability Microsample capabilit	ty	no yes	no yes
	Prepares microscopic	slides automatically or flags	no	no
	problems for slide p If auto. slidemaker av	rep ail., no. installed/list price	n/a	n/a
ŀ	Archives patient data	for later comparison	yes	no
	Patient-specific archiv	ving	yes	yes
ı		ccessible when system online Imeric results–no. specimens	5,000 samples 5,000	5,000 samples 5,000
ı		sto/cytograms–no. specimens	5,000	5,000
ı	•Stored in conjunct		yes	yes
ı		ages & CBC data printed as 1 report recalled and retransmitted	yes yes	yes yes
		ted for reprocessing or report transmission	yes	yes
ı	Performs delta checks		no	no
		s for followup, confirm. testing, or rerun for holding samples are defined by	yes user or vendor	yes user or vendor
ı	Some results can be t	ransmitted to LIS while others held	yes, through a selective batch process	no (all held)
	Scattergram display: o Histogram display: col	•	4 colors/cell types colors without thresholds	4 colors/cell types colors without thresholds
		cimen &/or result info. displayed	no	no
	LIS interface formats	supported	proprietary	proprietary
	Information transferre	ed on LIS interface	numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast	numeric & flag results, histograms & scatterplots, instrument to LIS; patient demographics, orders, LIS to instrument—broadcast
	LOINC codes transmitt Optional data mgmt. o		NO Ves	NO VAS
	Software features		yes enhanced QC, data archiving, common database, extensive decision rules,	yes enhanced QC, data archiving, common database, extensive decision rules,
	Interface avail. or plan	nned to auto. specimen-handling system	delta checking Beckman Coulter	delta checking Beckman Coulter
	Bar-code symbologies	s read on tube	Codabar, codes 39 & 128, interl. 2 of 5, NW-7	Codabar, codes 39 & 128, interl. 2 of 5, NW-7
	, ,	de placement per NCCLS standard Auto2A	no	no
		ntenance by lab personnel	monthly: 2 min	monthly: 2 min
	Onboard maintenance Time from communica	records ation of problem to engineer on-site	no 	no
		limited to software problems	yes/no no	yes/no no
-				
-		pased on cost-per-reportable result	yes	yes
	Distinguishing feature	S	VCS technology, lowest review rate in class, zero routine daily maint., triplicate counting, aperture burn circuit, sweepflow, SmartStart system, autoloader & single sample models	VCS technology, lowest review rate in class, zero routine daily maint., triplicate counting, aperture burn circuit, sweepflow, autoloader & single sample models
-		seant an andersament by the College of America		

Part 7 of 8			
Part 7 of 8		Beckman Coulter Inc.	Roche Diagnostics Corp.
		Martha M. Diaz/Cellular Analysis Marketing	Peggy Barranco
1		200 S. Kraemer Blvd., Brea, CA 92822-8000	9115 Hague Rd., Indianapolis, IN 46250-0475
		714-993-8847	800-428-5074
See related article,	, page 38	www.beckmancoulter.com	www.roche.com
Name of instrumen		Coulter AcT 5diff Family	Sysmex SF-3000
-	talled in U.S./outside U.S.	2001/2000	1996/—
No. units installed	in U.S./outside U.S./list price	75/300/\$43,500 cap pierce model; \$38,500 open vial model	100/2,300/\$120,000
Test menu:	Chartable	standard menu (left) plus: RDW, MPV	standard menu (left) plus: RDW-SD, RDW-CV, MPV
All instruments have		atyp. lymph # (ATL#), atyp. lymph % (ATL%), immature cells # (IMM#),	none
WBC, RBC, Hb, Hct, I MCH, MCHC, Plt, %&# i	MCV,	immature cells % (IMM%), PCT, PDW	DDO
mono, lymph, eos, baso	neut, •Flags	complete operator selectable flagging	RBC agglut, turbidity/Hb interference, WBC abn scattergram, RBC abn
			distrib, Plt abn distrib, NRBC/Plt clumps, blasts, immature grans, left
EDA algored tootal	but not clinically released	none	shift, atyp./abn lymph PDW, P-LCR
	t submitted for clearance	none none	none
Tests in developme		none	none
For research-use-o		PCT, PDW, IMM, ATL	none
Tests unique to an	•	none	none
Differential method	d(s) used	AcV technology combining cytochemistry, focused flow impedance, and	flow cyto with semiconductor laser for lymph, mono, neut, eos, baso
		light absorbance prinicples of measurement	
Linearity:	•WBC count (109/L)/RBC count (1012/L)	0.1-90/0.5-8.1	1-99.99/1-9.99
-	•Hemoglobin (g/dL)/platelet (109/L)	2.5-23/10-1,000	2-25/10-999
	•MCV (fL) or Hct (%)	10–70 (Hct)	10–60 (Hct)
Precision:	•WBC count/RBC count	<2%/<2%	3% (WBC>4)/1.5% (RBC>4)
	•Hb/platelet	<1%/<5%	1.5%/5% (PIt>100)
	•MCV or Hct	<1.0% (Hct)	1.5% (Hct)
Accuracy of autom	ated diff. compared with manual diff.,	not available in NCCLS H-20A format	neut% R>0.90, lymph% R>0.90, mono% R>0.75, eos% R>0.80, baso%
per NCCLS H-20A	•		R>0.50
Interfering substan		NRBCs, Plt clumps, large Plts, lyse-resistant RBCs	cold agglut, Plt clumps, NRBCs, cryoglobulins
J	•RBC	cold agglut, Plt clumps, WBC overlinearity	cold agglut, severe microcytosis, frag. RBCs, WBC > 100,000/µL
			, , , , , , , , , , , , , , , , , , , ,
	•MCV or Hct	Hct: lipemic samples, high WBC, cold aggluts	cold agglut, WBC>100,000/µL, abn RBC fragility
	Platelet	RBC and WBC fragments	Plt satellitism, Plt clumps, increased microcytosis, giant Plts
	•Hb	elevated WBC, lipemia	WBC>100,000/µL, lipemia, abn proteins
Interfering substan	nces: differential	lyse-resistant RBCs, NRBCs, lipemia	lyse-resistant RBCs
	ific reference ranges	yes	no e
	max. CBCs & diffs. per hr	60/60	80/80
	j. frequency of calib.	6 mos	with major PM or parts replacement
	ted/parameters calibrated	open/RBC, WBC, Hb, Hct, Plt	open by customer, others by svc./WBC, RBC, Hb, Hct, Plt
Frequency of blood		daily/none	2 levels per 8 hrs operation/service calibration only
	open/closed/sample dead vol. closed	53 μL/53 μL/0.5 mL	170 μL/270 μL/1 mL
Tube sampling sup		yes (multiple sizes)	yes (3 mL, 5 mL, 7 mL)
Veterinary capabili		no	no no
Microsample capal		yes	yes
	pic slides automatically or flags	no	no
problems for slid	• •	-1-	400/
if auto. Sildemaker	avail., no. installed/list price	n/a	>100/—
Archives natient da	ata for later comparison	yes	yes
Patient-specific are		no	no
•	a accessible when system online	10,000 samples	1,000 samples (additional on disk)
		10,000	1,000
		10,000	1,000
Memory capacity—			
Memory capacity— Memory capacity—	-histo/cytograms-no. specimens		·
Memory capacity— Memory capacity— •Stored in conju	-histo/cytograms-no. specimens inction with CBC data	yes	yes
Memory capacity— Memory capacity— •Stored in conju •Histo/cytogram	–histo/cytograms–no. specimens inction with CBC data i images & CBC data printed as 1 report	yes yes	yes yes
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Name of instrument First year sold-instal	lled in U.S./outside U.S.	Sysmex XE 2100/XE 2100-L 2000	Sysmex XE 2100 Alpha/HST 2000
,	U.S./outside U.S./list price	100/1,000/\$225,000	10/140/\$360,000-\$1,000,000
Test menu:	Chartable	standard menu (left) plus: NRBC %&#, retic %&#*, RDW-SD, RDW-CV, IRF*</td><td>standard menu (left) plus: NRBC %&#, retic %&#, RDW-SD, RDW-CV, IRF</td></tr><tr><th>All instruments have: WBC, RBC, Hb, Hct, MC</th><td>cv, •Laboratory</td><td>none</td><td>none</td></tr><tr><th>MCH, MCHC, PIt, %&# net mono, lymph, eos, baso</th><td></td><td></td><td></td></tr><tr><th>, ,,,,</th><td>•Flags</td><td>Plt clumps, RBC agglut, turbidity, WBC abn scattergram, RBC abn distrib, Plt abn distrib, RBC lyse resistance, NRBC/Plt clumps, blasts, immature</td><td>Plt clumps, RBC agglut, turbidity, WBC abn scattergram, RBC abn distrib, Plt abn distrib, RBC lyse resistance, NRBC/Plt clumps, blasts, immature</td></tr><tr><th></th><td></td><td>grans, atyp./abn lymphs, abn lymph/aged sample</td><td>grans, atyp./abn lymphs, abn lymph/aged sample</td></tr><tr><th></th><td>ut not clinically released</td><td>none</td><td>none</td></tr><tr><th>Tests not avail. but s Tests in development</th><td>submitted for clearance</td><td>none HPC %&#, IG %&#</td><td>none HPC %&#, IG %&#</td></tr><tr><th>For research-use-onl</th><td></td><td>MPV, P-LCR, PCT, PDW</td><td>MPV, P-LCR, PCT, PDW</td></tr><tr><th>Tests unique to analy</th><td>yzer</td><td>NRBC, IMI channel</td><td>NRBC, IMI channel</td></tr><tr><th>Differential method(s</th><td>hasu (a</td><td>flow cytometry using semiconductor laser RF/DC detecting method</td><td>flow cytometry using semiconductor laser RF/DC detecting method</td></tr><tr><th>Linearity:</th><td>•WBC count (109/L)/RBC count (1012/L)</td><td>0–170/0–8</td><td>0–170/0–8</td></tr><tr><th></th><td>•Hemoglobin (g/dL)/platelet (109/L)</td><td>0-25/0-5,000</td><td>0-25/0-5,000</td></tr><tr><th>Procision</th><td>MCV (fL) or Hct (%) WPC count/PPC count</td><td>0–60 (Hct)</td><td>0–60 (Hct)</td></tr><tr><th>Precision:</th><td>WBC count/RBC count Hb/platelet</td><td><3%/<1.5% <1.0%/<4.0%</td><td><3%/<1.5% <1.0%/<4.0%</td></tr><tr><th></th><td>•MCV or Hct</td><td><1.0% (Hct)</td><td><1.0% (Hct)</td></tr><tr><th>Accuracy of automat per NCCLS H-20A</th><td>ted diff. compared with manual diff.,</td><td>neut% R=0.95, lymph% R=0.95, mono% R=0.79, eos% R=0.92, baso%</td><td>neut% R=0.95, lymph% R=0.95, mono% R=0.79, eos% R=0.92, baso%</td></tr><tr><th>per NCCLS H-20A Interfering substance</th><td>es:•WBC</td><td>R=0.82, NRBC% R=0.96 cold agglut, Plt aggreg, nucl. RBCs, cryoglob., lyse-resistant RBCs in</td><td>R=0.82, NRBC% R=0.96 cold agglut, Plt aggreg, nucl. RBCs, cryoglob., lyse-resistant RBCs in</td></tr><tr><th>9</th><td></td><td>patients w/ hemoglobinopathies, severe liver disease, or neonates</td><td>patients w/ hemoglobinopathies, severe liver disease, or neonates</td></tr><tr><th></th><td>•RBC</td><td>cold agglut, severe microcytosis, frag. RBCs, large no. giant Plts, in vitro</td><td>cold agglut, severe microcytosis, frag. RBCs, large no. giant Plts, in vitro</td></tr><tr><th></th><td>•MCV or Hct</td><td>hemolysis Hct: cold agglut, leukocytosis (>100,000/µL), abn red cell fragility,</td><td>hemolysis Hct: cold agglut, leukocytosis (>100,000/µL), abn red cell fragility,</td></tr><tr><th></th><td></td><td>spherocytosis</td><td>spherocytosis</td></tr><tr><th></th><td>•Platelet</td><td>pseudothrombocytopenia, Plt aggreg, incr. microcytosis, megalocytic Plts</td><td>pseudothrombocytopenia, Plt aggreg, incr. microcytosis, megalocytic Plts</td></tr><tr><th></th><td>•Hb</td><td>lipemia, abn proteins in blood plasma, severe leukocytosis (>100,000/μL)</td><td>lipemia, abn proteins in blood plasma, severe leukocytosis (>100,000/μL)</td></tr><tr><th>Interfering substance</th><td></td><td>lyse-resistant RBCs</td><td>lyse-resistant RBCs</td></tr><tr><th>Age- and sex-specific</th><td></td><td>yes</td><td>yes</td></tr><tr><th></th><td>ax. CBCs & diffs. per hr</td><td>150/150</td><td>150/600</td></tr><tr><th>Recommended avg. f</th><td></td><td>annually</td><td>annually</td></tr><tr><th>Modes calibrated Frequency of blood/la</th><td>d/parameters calibrated</td><td>open, closed, capillary/WBC, RBC, Hb, Hct, Plt per CLIA requirements/not required</td><td>open, closed, capillary/WBC, RBC, Hb, Hct, Plt per CLIA requirements/not required</td></tr><tr><th></th><td>pen/closed/sample dead vol. closed</td><td>130 µL/200 µL/1 mL</td><td>130 µL/200 µL/1 mL</td></tr><tr><th>Tube sampling suppo</th><td></td><td>yes</td><td>yes</td></tr><tr><th>Veterinary capability Microsample capabil</th><td></td><td>no yes</td><td>NO VAS</td></tr><tr><th></th><td>ic slides automatically or flags</td><td>yes w/ Alpha or HST upgrade</td><td>yes yes</td></tr><tr><th>problems for slide</th><td></td><td></td><td></td></tr><tr><th>If auto. slidemaker a</th><td>vail., no. installed/list price</td><td>>100/TBD</td><td>>1,000/\$250,000</td></tr><tr><th>Archives patient data</th><td>a for later comparison</td><td>yes</td><td>yes</td></tr><tr><th>Patient-specific arch</th><td>•</td><td>yes</td><td>yes</td></tr><tr><th></th><td>accessible when system online numeric results–no. specimens</td><td>10,000 samples 10,000</td><td>10,000 samples 10,000</td></tr><tr><th></th><td>nisto/cytograms-no. specimens</td><td>10,000</td><td>10,000</td></tr><tr><th>_</th><td>ction with CBC data</td><td>yes</td><td>yes</td></tr><tr><th></th><td>mages & CBC data printed as 1 report e recalled and retransmitted</td><td>yes ves</td><td>yes ves</td></tr><tr><th></th><td>orted for reprocessing or report transmission</td><td>yes yes</td><td>yes yes</td></tr><tr><th>Performs delta check</th><td>ks</td><td>yes</td><td>yes</td></tr><tr><th></th><td>Its for followup, confirm. testing, or rerun</td><td>yes user or vendor</td><td>yes user or vendor</td></tr><tr><th></th><td>for holding samples are defined by transmitted to LIS while others held</td><td>user or vendor yes</td><td>user or vendor yes</td></tr><tr><th>Scattergram display:</th><td>: cell-specific color</td><td>yes</td><td>yes</td></tr><tr><th>Histogram display: co</th><td>olor with threshhold ecimen &/or result info. displayed</td><td>yes ves</td><td>yes ves</td></tr><tr><th>onoice of desired spe</th><td>comen worresult into displayed</td><td>yes</td><td>yes</td></tr><tr><th>LIS interface formats</th><td>s supported</td><td>RS-232C/TCP IP</td><td>RS-232C/TCP IP</td></tr><tr><th>Information transferr</th><td>red on LIS interface</td><td>numeric & flag results, histograms & scatterplots, instrument to LIS;</td><td>numeric & flag results, histograms & scatterplots, instrument to LIS;</td></tr><tr><th></th><td></td><td>patient demographics, orders, LIS to instrument—broadcast; host query for patient demographics & orders</td><td>patient demographics, orders, LIS to instrument—broadcast; host query for patient demographics & orders</td></tr><tr><th>LOINC codes transmi</th><td></td><td>–</td><td></td></tr><tr><th>Optional data mgmt. • Software features</th><td></td><td>yes, proprietary</td><td>yes, proprietary</td></tr><tr><th>- Suitware leatures</th><td>.o</td><td>enhanced QC, data archiving, data collation from multiple instruments, online QC</td><td>enhanced QC, data archiving, data collation from multiple instruments, online QC</td></tr><tr><th></th><td>anned to auto. specimen-handling system</td><td>Roche, Labotix, IDS, A&T</td><td>Roche, Labotix, IDS, A&T</td></tr><tr><th>Bar-code symbologie Accommodates bar-c</th><td>es read on tube code placement per NCCLS standard Auto2A</td><td>Codabar, codes 39 & 128, interl. 2 of 5, ITF, NW-7, EAN 8 & 13 yes</td><td>Codabar, codes 39 & 128, interl. 2 of 5, ITF, NW-7, EAN 8 & 13 yes</td></tr><tr><th>, lossimisuates par-c</th><td> provincin por 1100E0 diamatu AutoZA</td><td>,</td><td>,</td></tr><tr><th>•</th><td>aintenance by lab personnel</td><td>daily: 15 min</td><td>daily: 15 min</td></tr><tr><th>Onboard maintenance Time from communic</th><td>ce records cation of problem to engineer on-site</td><td>yes territory dependent</td><td>yes territory dependent</td></tr><tr><th></th><td>/limited to software problems</td><td>yes/no</td><td>yes/no</td></tr><tr><th>Mftr. can perform dia</th><td>agnostics via modem</td><td>yes</td><td>yes</td></tr><tr><th>Acquisition program</th><td>based on cost-per-reportable result</td><td>yes</td><td>yes</td></tr><tr><th>Distinguishing featur</th><td>res</td><td>enumeration of NRBCs, throughput of 150 CBCs/hr, random access,</td><td>multiple configurations available</td></tr><tr><th></th><td></td><td>discrete testing, network capability and extended linearities</td><td></td></tr><tr><th></th><td></td><td>* not available on XE 2100-L</td><td></td></tr><tr><th></th><td></td><td></td><td></td></tr></tbody></table>	