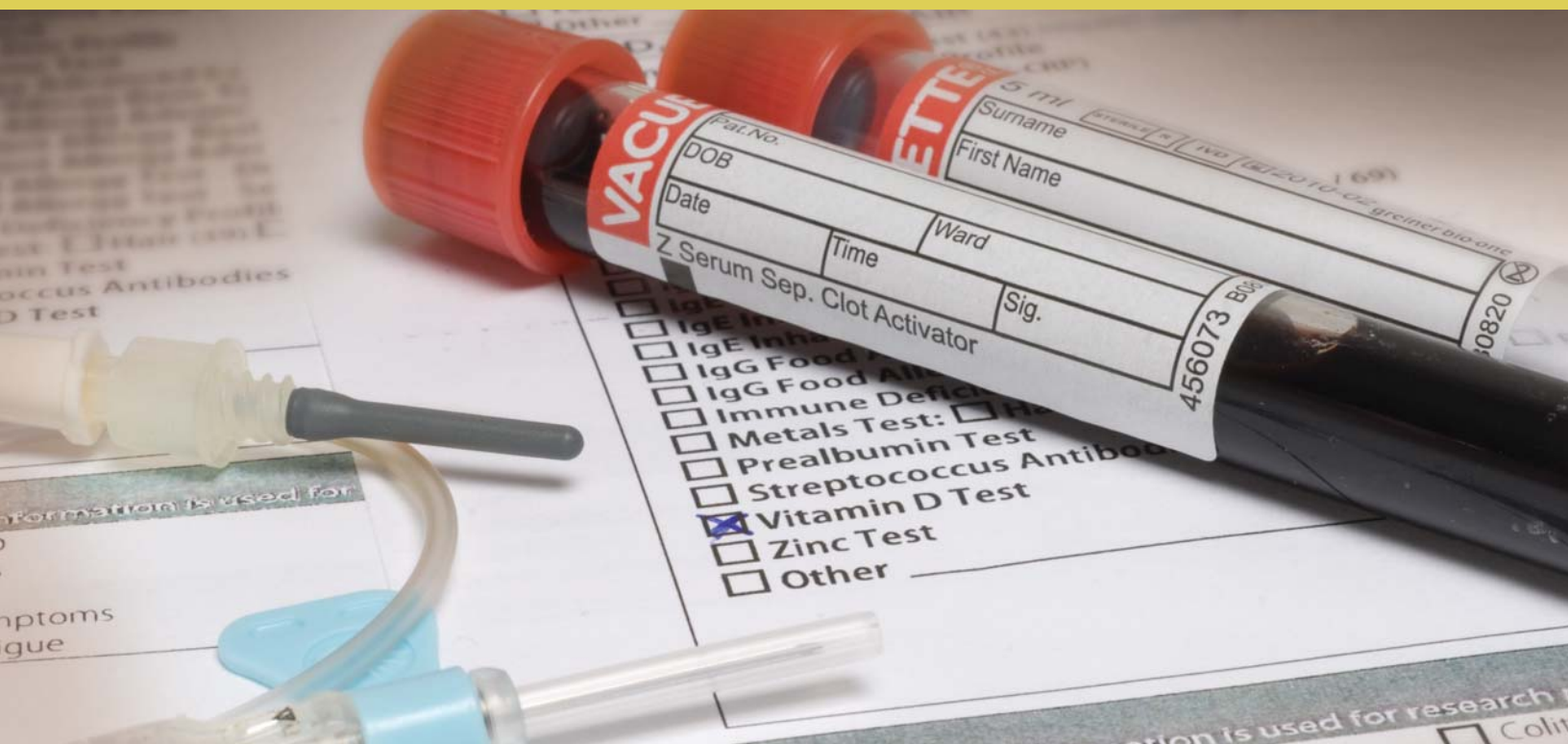


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Advances in Diagnostic Methods for Vitamin D Testing

With recent advancements in HPLC, new column technology, and Mass Spec, clinical methods are increasingly being converted to chromatography based assays, including Vitamin D. The need for data produced by analytical methods with greater accuracy and method specificity is driving clinicians to LC-MS-MS (HPLC coupled to a tandem Mass Spec) for tests such as Vitamin D, instead of traditional approaches such as immunology and RIA testing.

Continued Inside on Page 6

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This LABVITALS Issue includes two articles featuring the latest technologies for Vitamin D testing to enhance productivity and accuracy in your lab.

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D Dimer	Turbidimetric	< 0.478 ug/mL	2x100 (200)	89136-418	432.60
Fructosamine w/cal (FRUC)	Enzymatic	161-268 µmol/L	3x90 (270)	89136-378	278.10
Homocysteine w/cal (HCY)	Enzymatic	4.0-15.4 µmol/L	1x100 (100)	89136-298	612.85
Lipase w/cal	Enzymatic	6-32 IU/L	3x100 (300)	89136-386	386.25
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4	EM-MX0486-1	335.92	1,141.70
Acetonitrile			
4	EM-AX0156-1	365.37	1,281.45

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Advances in Diagnostic Methods for Vitamin D Testing

By: William Ciccone, MicroSolv Technology Corporation

Precision, accuracy, and high specificity are required in the modern clinical laboratory, and establishing a patient testing method that is reliable and economical is the primary goal.

Successes with Vitamin D2, D3 and 25 (OH) D3 analyses are good examples of why clinical scientists are moving toward LC-MS-MS as their method of choice for patient monitoring. There is increased interest in Vitamin D levels in blood due to evidence that deficiency in humans may be more common and severe than previously thought. This could have been a result of inadequate analytical methods used to determine population blood levels.

Many clinical research labs rely on protein-binding assays or RIA (radioimmunoassay) methods to determine Vitamin D levels in biological fluids. However, others are finding that LC-MS, or LC-MS-MS, are far less susceptible to the problematic sample matrix effects, which can have a negative impact on the data. Also, when properly used, LC-MS-MS can have much greater specificity and accuracy than most other methods.

LC-MS-MS can measure each compound by charge to mass ratios, and therefore accurately identify and report it with a high degree of confidence. HPLC is a very important part of the methodology and is needed to sufficiently separate the compounds of interest and the sample matrix for the mass spectrometer. If an orthogonal HPLC method is added to this, the degree of confidence soars in the quality of the data. Identification and quantitation of all sample compounds, including unknowns, is then confirmed.

Another factor which has encouraged the conversion to LC-MS-MS for Vitamin D analysis is that 25(OH)D3 epimer, wrongly thought to be present only in infants, is indeed present in adults and is a significant compound of interest. During Reverse Phase (RP) HPLC, this compound co-elutes with Vitamin D3, making the analysis and quantitation suspect and possibly biased. Previous methods used for quantitation (RIA method) did not capture these epimers, making the cross-over studies to LC-MS-MS more complicated. Separating D2 from D3 can easily be accomplished in RP HPLC, but separating the 25(OH)D3 epimer from D3 may require different HPLC column selectivity, perhaps in a different chromatographic mode.

VWR is working with technology development companies such as MicroSolv Technology Corporation (Eatontown, NJ), to bring new tools and advancements with important benefits to the clinical lab. One such advancement is the Cogent TYPE-C™ Silica based HPLC column. These columns feature an advanced silica material – neither hybrid or polymeric – with a unique surface chemistry that solves many of the challenges associated with clinical chemistry. Cogent TYPE-C columns offer great method robustness, including the ability to easily perform direct injections of biological samples (such as urine and serum) without extensive sample preparation. Other benefits to clinical scientists include standard and unique selectivities that can separate many compounds such as epimers and isobaric compounds that other columns cannot, making the MS-MS even more reliable.

Cogent TYPE-C columns can reduce matrix effects. However, different from other silica-based HPLC columns, they will not permanently bond unwanted compounds from the sample matrix to the silica surface, resulting in a much longer column life. Unlike ordinary silica that has common silanols (Si-OH), the Cogent TYPE-C has terminal silica hydride (Si-H) groups, which allows the surface to be slightly hydrophobic. Using a proprietary process developed at San Jose State University (San Jose, CA) by Prof. Joseph Pesek, further derivatization of the surface is accomplished, producing an advanced and extremely stable C18, C8, Cholesterol, and the unique Diamond Hydride™ phases. These phases fall into the category of “silica hydride columns,” and are extremely well suited for LC-MS-MS and biological samples.

As a result, the silica surface has significant benefits because it adsorbs and desorbs solvents and other molecules very differently from ordinary silica, including the most common solvent - water. All ordinary silica-based HPLC columns contain water that dominates the silica surface. (See Figure 1) This can be problematic when injecting biological compounds onto a column and then using aqueous solvents to “elute” the sample matrix from the column.

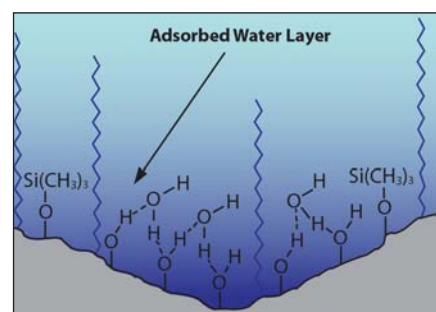


Figure 1

The silica hydride columns will not permanently adsorb water. (See Figure 2) You can easily incorporate a rinse step between runs to elute most unwanted sample matrix molecules from the column using a 50:50 mix of water:IPA, or almost any other solvent combination that is miscible. The TYPE-C bonded phases such as Bidentate™ C8™, UDC-Cholesterol™, and Bidentate™ C18™ have another key advantage - the bonding itself. Direct silicon-carbon bonds, and no end-capping of any kind, allow these columns to be impervious to low pH. Therefore, adding acids to the mobile phase, which will increase signal to noise, is not harmful to the column.

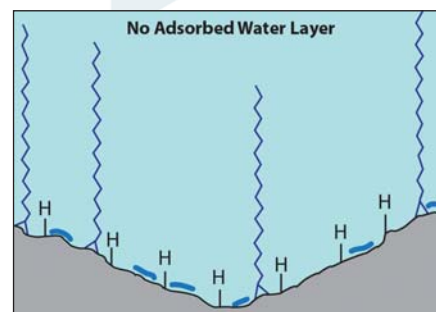


Figure 2

Another benefit of the technology is the precision achieved by eliminating water in the column. The speed in which the columns equilibrate for the next injection, even after a gradient method, is remarkably useful, fast, and reliable. This increases the profitability

of any laboratory by being able to run more samples; there is no investment of time waiting for the column to be flushed 10 times as required in many LC-MS-MS methods. You can clean the column and be ready for the next run after one to two column volumes. But perhaps the most significant benefit is the ability to have any of three chromatographic modes (RP, ANP, or NP) on one column, simply by selecting different mobile phases or mobile phase concentrations. You can choose to run a standard RP method, or run ANP (aqueous normal phase) to separate the 25(OH)D₃ epimers from D₃ simply by using a high to low concentration of Acetonitrile and water.

With this new column technology, you can show improved precision and orthogonality by using one column in one method that is orthogonal to itself, and have substantive support of your data. When Cogent TYPE-C columns are used in the ANP mode, compounds are separated by polarity or functional groups, and not by hydrophobicity of the molecules as in RP. This separation occurs with a high organic content (can be as high as 95%) in the mobile phase with acid or base added to the solvents. This can greatly enhance the signal-to-noise ratio in MS by aiding in the ionization of the compounds, thus resulting in better data and fewer challenges to your data.

There are many benefits to using this advanced column technology, but perhaps the best way to fully appreciate this is from the perspective of the laboratory's bottom line. Consistently producing precision and great accuracy over an extended column lifetime is of high value. As mentioned, the turn-around time between runs (even gradients), can be significantly reduced from current columns being used. Additionally, another benefit is the reduction of operational costs. Having a column that better withstands the rigors of the clinical laboratory, and produces more runs per column, allows you to do more with less.

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Additional literature is available upon request.



Description	Size, mm	Cat. No.	Each
4µm, 100A HPLC Columns. Stainless Steel Hardware			
Cogent Bidentate C8	2.1 x 50	97034-946	450.50
Cogent Bidentate C8	2.1 x 100	97034-952	533.18
Cogent Bidentate C8	2.1 x 150	97034-958	603.99
Cogent Bidentate C18	2.1 x 50	97034-966	450.50
Cogent Bidentate C18	2.1 x 100	97034-972	533.18
Cogent Bidentate C18	2.1 x 150	97034-978	603.99
Cogent Diamond Hydride	2.1 x 50	97035-032	450.50
Cogent Diamond Hydride	2.1 x 100	97035-040	533.18
Cogent Diamond Hydride	2.1 x 150	97035-046	603.99
Cogent UDC-Cholesterol	2.1 x 50	97035-010	450.50
Cogent UDC-Cholesterol	2.1 x 100	97034-996	533.18
Cogent UDC-Cholesterol	2.1 x 150	97035-000	603.99

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1700 C-Line Slim Line	25; 22s/pst3	89173-252	103.00
1700 C-Line	50; 22s/pst3	89173-256	67.00
1700 C-Line Slim Line	100; 22s/pst3	60376-040	79.36
1700 C-Line Slim Line	100; 22/pst3	21492-556	76.18
1700 C-Line	250; 22/pst3	60376-042	77.22
1700 C-Line	500; 22/pst3	21492-558	133.31
1000 C-Line	1,000; 22/pst3	89173-256	67.00
1000 C-Line	2,500; 22/pst3	89173-258	73.00
1000 C-Line	5,000; 22/pst3	89173-260	91.00

Determination of Vitamin D Metabolites in Human Serum Using Automated ITSP Solid Phase Extraction and Liquid Chromatography-Tandem Mass Spectrometry

Kimberly Napoli Eaton¹, Kenneth C. Lewis¹, Kim Gamble², ¹OpAns, LLC, Durham NC 27713, ²MicroLiter Analytical Supplies, Inc., Suwannee, GA 30024

ABSTRACT

Due to their hydrophobic nature and strong binding to Vitamin D binding protein, accurate quantitation of the clinically relevant 25-hydroxy metabolites of Vitamins D3 and D2 is difficult. Acetonitrile, methanol or, alternatively, multi-step liquid-liquid extraction with hexane or heptane has been used to disrupt protein binding, but must be followed by further sample cleanup with offline or online solid phase extraction (SPE). LC-MS allows for quantitation of the two compounds simultaneously.

We have developed a quantitative method for the determination of 25-OH D3 and 25-OH D2 that utilizes calibrators and internal standard stabilized in a protein-based matrix, mimicking human serum. Salts, proteins and phospholipids are removed via solid phase extraction (SPE) using an advanced restricted access material with Instrument Top Sample Preparation (ITSP). Reverse phase liquid chromatography with multiple reaction monitoring (MRM) under atmospheric pressure chemical ionization (APCI) mass spectrometric condition is used for specific and sensitive detection.

EXPERIMENTAL

Sample Preparation

25-OH D3 and 25-OH D2 standard materials and Internal Standard were dissolved in ethanol and stored in the dark at -80°C. Concentrations were confirmed against 264 nm molar UV absorptivities of 18,300 and 19,400 (1/m-cm)¹, respectively. Bovine serum albumin (6%) in phosphate buffered saline (BSA/PBS) was supplemented with the analytes to provide 5, 10, 25, 50, 75 and 100 µg/L. Quality control was Tri-Level Vitamin D Plus Serum Toxicology Controls (UTAK Laboratories).

Sample aliquots (200 µL) were mixed with internal standard (20 µL; 1920 µg/L in BSA/PBS) and then protein binding was disrupted by addition of 400 µL of 1% formic acid in acetonitrile. Samples were well mixed, then incubated in the dark for 15 min, followed by centrifugation. Finally 250 µL of supernatant was mixed with 100 µL water in preparation for SPE using ITSP.

ITSP SPE Method

A CTC Analytics HTC PAL sample handler was configured with a 100 µL syringe and a cold stack with 3 tray holders, one to hold sample extracts, one for ITSP cartridges and one for final eluates. The SPE program, adapted from a standardized procedure² to maximize sample cleanliness³ and recovery of the analytes, was as follows:

SPE Cartridges: ITSP Evolute ABN 10 mg (MicroLiter Product 07-BABN10-20A)
Solvent A: Acetonitrile
Solvent B: Methanol
Solvent C: 1% Formic acid in water
Solvent D: 40% Acetonitrile in water
Solvent E: Water

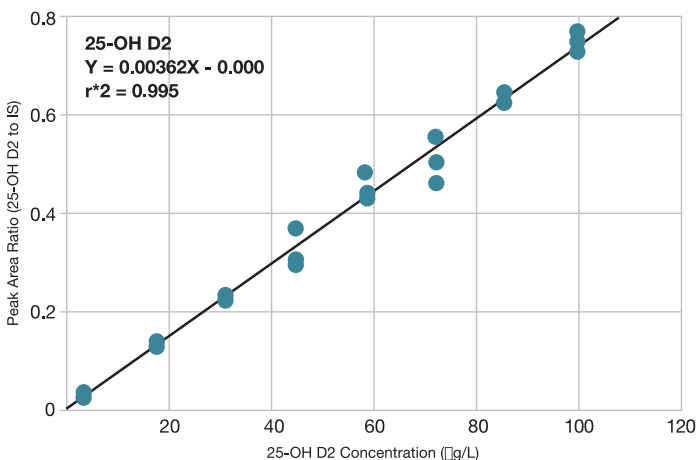
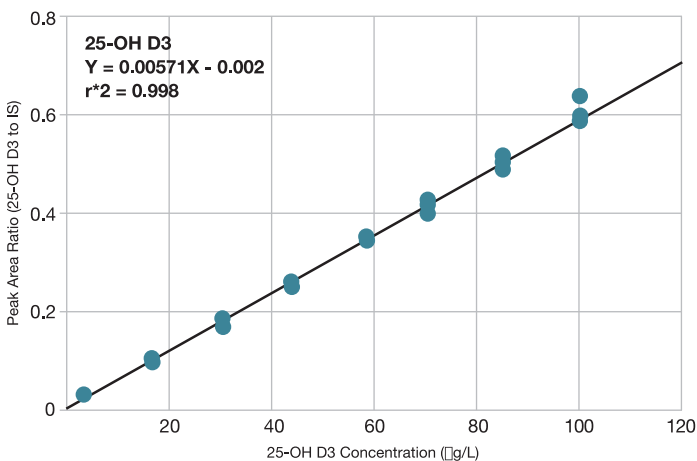
Step	Solvent	Volume, µL	Flow Rate, µL/sec.
Clean SYR	A	100 x 3	200
Condition	B	100	15
Equilibrate	C	100	15
Flush	Air	50	15
Load	Sample	100 x 3	5
Flush	Air	50	15
Clean SYR	E	100 x 3	200
Clean SYR	A	100 x 3	200
Clean SYR	E	100 x 3	200
Wash	C	100	15
Wash	D	100	15
Flush	Air	50	15
Elute	B	50 x 2	5
Flush	Air	50	20

Analysis Method

Instrument: Agilent 6410 triple quadrupole with Agilent Model 1200 HPLC system
Solvent A: 0.1% Formic acid in methanol
Solvent B: 0.1% Formic acid in water
Column: Agilent Zorbax Eclipse Plus C18 Narrow Bore RR (2.1 x 50 mm, 3.5µ)
Mobile Phase: 87% A, 0.25 mL/min, 5.0 min end
Column Temp: 50°C
Injection Volume: 10 µL
Ionization Mode: APCI+ (multimode source)
Mass Transition/ Collision Energy: 401.3>383.4; 2 (25-OH D3 quantifier)
 401.4>159.1; 24 (25-OH D3 qualifier)
 407.4>389.4; 2 (IS quantifier)
 407.4>159.1; 24 (IS qualifier)
 413.4>395.4; 2 (25-OH D2 quantifier)
 413.4>159.1; 24 (25-OH D2 qualifier)

RESULTS

Linearity across the concentration range was confirmed by analysis in triplicate of 8 samples prepared by proportional dilution of the lowest with the highest calibrator standard⁴. Deviations from expected were $+0.1 \pm 4.7\%$ (range -7.7 to +13.8%), 25-OH D3; $0.5 \pm 6.3\%$ (range -10.9 to +15.3%), 25-OH D2. Correlation coefficients met or exceeded 0.995.



Functional sensitivity was assessed on 4 separate days using 4 injections of 5 samples prepared by diluting quality control materials with BSA/PBS to concentrations near to the anticipated LOQ5. Respectively, percentage coefficient of variation and deviation at the lowest levels assessed were 5.9% and -1.1% for 25-OH D3 at 4 µg/L; 12.8 and -5.5% for 25-OH D2 at 4.9 µg/L.

Recovery of the analytes from serum matrix was assessed by supplementing quality control materials with 10 and 25 µg/L of the analytes. Triplicate replicates were compared to control material. From the Low control, 9.82 (98.2%) and 22.9 (91.6%) µg/L of 25-OH D3 were recovered and 9.48 (94.8%) and 22.8 (91.3%) µg/L from the Level 1 control. For 25-OH D2, 10.6 (106.5%) and 23.3 (93.1%) µg/L were recovered from the Low control and 9.56 (95.6%) and 23.4 (93.5%) µg/L from the Level 1 control.

Precision experiments to determine within run and total imprecision were performed using two replicates of each of three levels of the quality control materials across six independent analytical runs (n=12)⁶. Each run was controlled using a 6-point calibration curve.

Analyte	Conc, µg, L	Conc, µg, L	Percent	
			Within	Total
25-OH D3	11.1	11.3	2.0	4.6
	27.6	24.4	3.0	3.4
	65.1	60.5	3.0	4.8
25-OH D2	13.6	13.4	2.4	7.5
	39.4	38.3	3.3	5.0
	97.2	92.8	3.9	5.5

No injection-to-injection carryover of 25-OH D3, 25-OH D2 or IS by the LC-MS system was observed on any occasion when a methanol blank was injected immediately following the highest BSA/PBS calibrator. Neither was any sample-to-sample carryover by the PAL observed on any of three occasions when a BSA/PBS blank was processed immediately following the highest BSA/PBS calibrator and injected into the LC-MS system prior to any analyte- or IS-containing sample.

CONCLUSIONS

ITSP SPE for the determination of vitamin D metabolites utilizes small sample volume and the benefits of using an advanced restricted access material. Unlike offline SPE, it is automated; this allows operator freedom for other activities and improves sample turnaround time. The procedure met or exceeded all expectations. Samples that may contain epi-25-hydroxy or 1-OH metabolites of Vitamins D3 or D2 will require an alternative chromatographic method.

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ITSP Streamlines Implementing LC-MS/MS

When considering LC-MS/MS for your laboratory one of the main concerns is instrument stability to maintain reliable results. Many techniques side step using Solid Phase Extraction, the important step to protecting the instrument, because SPE is time consuming, requires a relatively high level of expertise and/or expensive off-line automation.

ITSP allows the laboratory to in-line automate SPE using the CTC Analytic's PAL System to prep the sample and remove unwanted column contaminants while the LC-MS/MS is analyzing a prior sample, saving the costs of expensive manual and off-line automated techniques. ITSP is also a very scaled down process that requires minimal solvents and patient samples. It is not uncommon for prep-to-injection volumes for all required solvents and patient samples to be less than 1 mL.

Run routine patient monitoring with the ability to add stat patient samples at the same time for a quick turn-around of these vital results. Depending on the number of samples several assays can be managed on one ITSP/LC-MS/MS instrument.

Available Through VWR International

ITSP technology is supported by many instrument manufacturers and integrates fully into most analytical instruments' operating software. ITSP Filtration and SPE cartridges are available through VWR International. MicroLiter offers expert technical support for installing on new instruments or simply upgrading an existing system to prep samples in-line.

Description	Cat. No.	Each
ITSP Hardware Kit	97045-932	Ea./ 2,083.47
ITSP w/ BioTage ABN, 10mg	97045-880	Pk. 100/ 276.11
96-Well Plate Covers, EVA/Round Well, Piercable, Natural	97044-552	Ea./ 5.97
96-Well Plate Covers, Silicone, Sprayed PTFE Barrier, Round Well, Thin Barrier	97044-832	Ea./ 15.52
μL plate, Deep Polypropylene, Natural Round Well Bottom, 1.3mL	97045-306	Ea./ 4.90

Thermco Healthcare Thermometers



Certified Low-Temp



Big Digit



AABB Models



Description	Cat. No.	Each
AABB Block Heater 18/60°C	89137-086	49.33
AABB Block Heater 30/110°C	89137-088	49.33
AABB Blood Bank -5/20°C	89137-082	57.59
AABB Blood Bank Refrigerator -5/20°C	89137-102	27.79
AABB Blood Bank Refrigerator -5/20°C*	89137-104	35.98
AABB Freezer -30/0°C	89137-078	49.33
AABB Incubator 18/50°C	89137-084	49.33
AABB Refrigerator -5/15°C	89137-080	49.33
AABB Ultra-Low Freezer -90/20°C	89137-076	49.33
Certified Temperature Spirit -100/50°C Calibrated at -80, -20, 0, 4, 25, 37°C	89137-090	349.75
Certified Temperature Spirit -20/110°C Calibrated at -10, 0, 4, 25, 37, 56, 105°C	89137-092	329.31

Description	Cat. No.	Each
CLIA Block Heater 0/110°C	89137-098	45.23
CLIA Block Heater 0/110°C *	89137-100	53.40
CLIA Block Heater 25/57°C	89137-094	45.23
CLIA Block Heater 25/57°C *	89137-096	53.40
CLIA Water Bath/Incubator 0/50°C	89137-106	45.23
CLIA Water Bath/Incubator 0/50°C*	89137-108	53.40
Clinical Reference, Digital -100/300°C	89137-112	410.17
Clinical Reference, Digital -50/300°C	89137-110	410.17
NIST Block Heater, Big Digit -50/70°C	89137-074	49.30
NIST Freezer, Big Digit -50/70°C	89137-068	49.30
NIST Incubator, Big Digit -50/70°C	89137-072	49.30
NIST Refrigerator, Big Digit -50/70°C	89137-070	49.30

* Safety Coat

BD Microtainer® MAP Microtube for Automated Process

Introducing the First One-Piece Instrument Compatible Microtube

Patient

- **Identification:** 13 x 75 mm diameter allows for full size labeling to avoid potential errors
- **Right the First Time:** reduction of repeat specimen collection caused by non-standardized process transfer and labeling errors
- **Smaller Sample Required:** for fragile vein or anemic patients where sample quality is important

Clinician

- **Ease of Handling:** one piece design eliminates the need for assembly or discard of extra contaminated parts
- **Ease of Labeling:** label will fit directly on tube without extender, V-Notch™ feature provides visual guide for proper placement
- **Workflow Improvement:** the integrated collection tip facilitates direct collection into the tube to avoid clotting and transfer steps

Laboratory

- **Accessing is Streamlined:** by providing positive patient identification and eliminating the need for relabeling
- **Workflow Improvement:** tube is standard 13 x 75 mm size and can go directly onto instrument racks and has a pierceable cap - no manual processing required
- **Uncompromised Quality:** streamline your work processes to deliver uncompromising standards of quality



BD Microtainer MAP Microtube	Volume, µL	Cat. No.	Pk of 200	Case of 4
13x75mm	250-500	95062-843	44.17	166.43

Contact your VWR Sales Representative for additional product information at 800.532.9000.

Temperature Assurance Products



Diagnostic Shippers

Tube or mailer systems include 3 or 8 approved 10 mL specimen tubes, leak resistant foam shippers, absorbent material, waterproof tape, leak-proof press-lock poly bag, corrugated shipping carton, UN3373 Biological Substance label and instruction sheet.

Diagnostic Shipper	Dimensions, L x W x H in.	Cat. No.	Each
3 Tube	5 $\frac{5}{8}$ x 4 x 2 (ext.)	16465-164	144.70
8 Tube	10 $\frac{1}{2}$ x 5 $\frac{5}{8}$ x 3 (ext.)	73320-122	419.39



Flexible Mailer for Diagnostic Specimens (w/o tubes)

- The next generation in transport packaging for hazardous specimens
- Complies fully with U.S. Postal Service, DOT, and IATA regulations for transport of clinical and diagnostic specimens (UN 3373) by air or ground: Domestic Mail Manual Part 8.6; Title 49 CFR, Part 173.199; and IATA Packing Instruction 650
- Includes all required secondary and outer packaging components. Users provide only leak-proof specimen containers (primary receptacles), such as tubes, vials, cups, etc. Accommodates any size and quantity of specimen containers that fit inside the flexible secondary envelope with required absorbent material
- Maximum capacity is 300 mL or less

Dimensions, L x W x H in.	Envelope Dimensions	Cat. No.	Each
4 x 4 x 9 $\frac{1}{2}$ (int.)	5 $\frac{1}{4}$ x 8 $\frac{3}{4}$	87003-906	129.50
11 x 8 x 4 $\frac{1}{4}$ (int.)	5 $\frac{1}{4}$ x 8 $\frac{3}{4}$	87003-908	107.12

Proline® Plus Mechanical Pipettes from Biohit

The Leader in Liquid Handling

The Proline Plus pipette family offers a wide variety of both fixed and adjustable volume models for every laboratory, ranging in volumes from 0.1 μ L to 10 mL. The new Proline Plus incorporates 25 years of experience including a unique combination of novel and patented features.

- Available in single-channel and multichannel
- Reduced pipetting forces prevent RSI and improve results
- Accurate and precise pipetting
- Contamination-free pipetting with Safe-Cone Filters
- Robust design
- Fully autoclavable
- Optiload tip sealing in all multichannel pipettes
- Uses both Biohit brand and other major brands of pipette tips
- Fixed volumes available in single-channels
- Simple and easy to maintain



Innovating for Health

For a FREE demo please contact Biohit Customer Service at 1.800.922.0784.

Proline Plus Pipette	Cat. No.	Each
Single-Channel		
0.1-3 μ L	89082-274	250.11
0.5-10 μ L	89082-276	250.11
2-20 μ L	89082-278	250.11
10-100 μ L	89082-280	250.11
20-200 μ L	89082-282	250.11
100-1,000 μ L	89082-284	250.11
500-5,000 μ L	89082-286	250.11
1-10mL	89082-288	250.11
8-Channel		
0.5-10 μ L	89082-290	588.37
10-100 μ L	89082-292	588.37
30-300 μ L	89082-294	588.37
12-Channel		
0.5-10 μ L	89082-296	718.57
10-100 μ L	89082-298	718.57
30-300 μ L	89082-300	718.57

CLARITY DOA Testing



- One step drug panel urine screen, with or without adulteration parameters
- 24 month shelf life at room temperature from date of manufacturing
- Results as fast as 4 minutes
- Built in control to validate results
- CPT code G0434
- Custom configurations available
- SAMSHA defined concentration cut off levels
- Accuracy similar to laboratory tests



Diamond Kitting Solutions

Customized Test Kits For Your Diagnostic Needs

- Diagnostic Test Kits
- Just in Time Kit Building
- Kit Design Optimization
- Supply Chain Optimization

Exclusively Available Through VWR International

CLARITY Multi-Drug of Abuse Tests	Cat. No.	Box of 25
Urine Panels		
5 Drug	95064-058	135.66
5 Drug w/ADT	95064-060	169.66
10 Drug	95064-062	271.41
10 Drug w/ADT	95064-064	293.92
Urine Cups		
5 Drug	95064-066	220.50
5 Drug w/ADT	95064-068	245.96
10 Drug	95064-070	310.43
10 Drug w/ADT	95064-072	347.42
10 Drug (OXY)	95064-074	237.55

Contact your VWR Sales Representative for additional product information at 800.932.5000.

Biotix™ – A Better Tip™

Biotix, the name you trust for your laboratory consumables, has developed A Better Tip, featuring exclusive cutting edge technologies. To learn more visit www.vwrsp.com/biotix today!

- **FLEXFIT™** - Revolutionary tip design significantly lowers insertion and ejection forces and creates a universal fit and superior seal
- **PHANTOM HINGE™** - Hidden hinge built into the Biotix manual tray; lid can be used as a lift-off or hinge lid, and doesn't interfere with SBS profile
- **X-RESIN™** - Highest clarity resin that is soft and naturally low retentive; easy to visualize samples
- **DELTA FILTER™** - Pipette tip filter that changes color upon contact with liquids or aerosols; locks in potential contamination shielding the pipettor from cross contamination
- **BLADE™** - Eliminates the need for tip touch off by minimizing the surface area at the distal end, prevents droplets from forming and increases dispense precision
- **Serial Numbering** – Each tray of pipette tips is traceable via a unique serial number labeled on the tray
- **ANTI-MICROBIAL RESIN** – Actively eliminates airborne contamination
- **BIOREADY™** - Every lot of product is certified to be free of contaminants



Biotix™
Fluid Innovation

Description*	Tips Per Pack	Cat. No.	Pack of/
10µL Tip	10 racks of 96	89136-570	960/ 79.14
10µL XL Tip	10 racks of 96	89136-574	960/ 79.14
200µL Tip	10 racks of 96	89136-578	960/ 79.14
300µL Tip	10 racks of 96	89136-566	960/ 79.14
1,250µL Tip	10 racks of 88	89136-586	960/ 94.34
Filtered			
10µL Tip	10 racks of 96	89136-572	960/ 128.34
10µL XL Tip	10 racks of 96	89136-576	960/ 128.34
20µL Tip	10 racks of 96	89136-582	960/ 128.34
100µL Tip	10 racks of 96	89136-580	960/ 128.34
300µL Tip	10 racks of 96	89136-568	960/ 128.34
1,250µL Tip	10 racks of 88	89136-588	880/ 144.54

* All natural and pre-sterile



Hand Written Labels Are Risky Business

Take the 1st step to reducing medical errors!

Brady offers complete, process-resistant solutions to help eliminate the risks and errors associated with poorly marked or unmarked slides, vials and other testing equipment.

Description	Cat. No.	Price
LabXpert™ Labeling System	80090-446	538.05
Stainerbondz™ LabXpert™ Cartridge, (0.90 x 0.90 in.)	89129-522	60.86
BBP™11 Thermal Transfer Printer	89125-008	3,869.25
Stainerbondz™ Slide Label, 1 across (0.90 x 0.90 in.)	89098-180	195.98
4 in. x 242 ft. Ribbon	89125-016	66.82
Stainerbondz™ Slide Label, (0.90 x 0.75 in.)	89098-182	185.50
Stainerbondz™ Slide Label, 4 across (0.90 x 0.90 in.)	89098-188	185.50



Brinkmann® Bottletop Dispensers

Accurately Dispense and Control Vapors from Almost Any Laboratory Solvent Bottle!

Brinkmann Bottletop Dispensers are ideal for dispensing aliquots of liquid from large supply bottles.

Features

- Fully autoclavable for simple cleaning/maintenance
- Telescopic filling tube for use with most bottles
- Wiping piston design reduces any chance of crystallization
- Supplied complete with telescopic filling tube, wrench and three adapters (for outer diameters of 28 mm, 40 mm and 45 mm)
- Fits on external threads of 32 mm (adapter, required for ChemSaver models, is included)



Brinkmann ChemSaver® Features

- Fine adjustment depending on viscosity of liquid
- Recirculating safety valve reduces waste by channeling reagent back into the bottle during priming



Volume, mL	Cat. No.	Each
Bottletop Dispensers		
0.1 to 2.5	17553-522	472.96
1.0	17753-534	432.15
1.0 to 5.0	17553-524	472.96
2.0 to 10.0	17753-526	472.20
5.0	17753-536	432.15
5.0 to 25.0	17753-528	642.99
10.0	17753-538	432.15
10.0 to 50.0	17753-530	673.15
20.0 to 100.0	17753-532	994.62
ChemSaver Dispensers		
0.1 to 2.5	17753-540	502.34
1.0 to 5.0	17753-542	502.34
2.0 to 10.0	17753-516	502.34
5.0 to 25.0	17753-518	693.23
10.0 to 50.0	17753-520	693.23
20.0 to 100.0	17753-522	1,105.15

VWR® Sharps Container Systems



Sharps container systems provide solutions for the safe and effective containment and disposal of contaminated needles, syringes, and other sharps. Choose from three different systems in a variety of sizes. The stackable sharps containers are puncture-resistant and autoclave- and incinerator-safe. They feature transparent, locking lids and needle removal ports. The tortuous path systems restrict hand entry. The extended neck sharps containers feature a funneled vertical drop and extended handles.



New VWR® Ultra High-Performance Pipettors

Offer Superior Ergonomics!
Visit vwr.com for more information.



Size	Volume	Dim., L x W x D cm (in.)	Cat. No.	Case of/
Stackable Sharps Containers				
Small	0.9L	8.9 x 8.9 x 17.8 (3½ x 3½ x 7)	19001-001	72/ 141.28
Medium	3.8L	25.4 x 17.8 x 12.7 (10 x 7 x 5)	19001-003	24/ 101.45
Large	7.8L	25.4 x 17.8 x 24.1 (10 x 7 x 9½)	19001-006	24/ 139.43
X-Large	30.3L	28.6 x 28.6 x 34.9 (11¼ x 11¼ x 14)	19001-010	10/ 145.81
Medium*	3.8L	25.4 x 17.8 x 17.1 (10 x 7 x 6¾)	19001-005	12/ 80.62
Large*	7.8L	25.4 x 17.8 x 28.6 (10 x 7 x 11¼)	19001-008	10/ 80.08
XX-Large	60.6L	28.6 x 28.6 x 64.8 (11¼ x 11¼ x 25½)	19001-013	6/ 188.07

* Tortuous Path

BRAND Transferpette® S Pipettes

Lightweight, Precise, Reliable!

The BRAND Transferpette® S pipettes from BrandTech Scientific offer an array of performance and convenience features for unparalleled comfort and ease-of-use. Single channel models are available in volume ranges from 0.1 µL to 10 mL and multichannel models from 0.5 to 300 µL.

- True one-handed operation and volume adjustment
- Short pipetting stroke to reduce fatigue
- Completely autoclavable
- Easy in-lab calibration without tools
- Accepts universal tips for economy

All pipettes ship with free shelf mount, performance certificate and three-year warranty, plus a 30-day, money-back guarantee from BrandTech!

Contact your VWR Sales Representative for details.



BRAND Transferpette S, µL	Cat. No.	Price
Single Channel Pipettes*		
0.1-1	89042-172	324.88
0.5-10	89042-174	294.88
2-20	89042-176	294.88
10-100	89042-178	294.88
20-200	89042-180	294.88
100-1,000	89042-182	294.88
500-5,000	89042-184	294.88
1,000-10,000	89042-186	294.88
Multi-Channel Pipettes		
8-Channel 0.5-10	89080-126	702.76
8-Channel 5-50	89080-128	702.76
8-channel 10-100	89080-130	702.76
8-Channel 20-200	89080-132	702.76
8-Channel 30-300	89080-134	702.76
12-Channel 0.5-10	89080-136	869.65
12-Channel 5-50	89080-138	869.65
12-Channel 10-100	89080-140	869.65
12-Channel 20-200	89080-142	869.65
12-Channel 30-300	89080-144	869.65
Accessories		
Carousel Stand	89042-214	127.20
Shelf Mount	89042-212	26.88

* Fixed volume models also available



Why Puritan® Diagnostic Swabs?

We're known in the diagnostic field for **consistent quality**, **repeatable results**, and **dependable product availability**. Count on our swabs to deliver exactly what you need out in the field and in the lab.



As always, Puritan responds to market need with high-quality products. We are tuned into the diagnostic/ healthcare world. We work hand-in-hand with our customers. By helping you solve challenges, we stay on the leading edge of our industry — creating the best single-use products to assist in reliable specimen collection and accurate diagnoses.

Our PurFlock® swabs are a great example. The flock fibers are fully integrated with the handle by our proprietary manufacturing process so there are no heavy adhesives to interfere with bonding or with sample collection. The CDC has recommended sampling be done with synthetic tip materials and our flock swabs are ideal for those applications.



Description, Full Length mm (in.)	Cat. No.	Each
Non-Sterile - Polystyrene Handle Flock Tip		
Standard, 153.416 (6.04)*	95057-792	28.95
Mini, 153.416 (6.04)	95057-794	15.03
Ultrafine, 152.908 (6.02)*	95057-796	56.27
Micro Ultrafine, 153.162 (6.03)*	89133-774	63.25
Sterile - Polystyrene Handle Flock Tip		
Standard, 153.416 (6.04)*	95057-786	26.78
Mini, 153.416 (6.04)	95057-788	16.05
Ultrafine, 152.908 (6.02)*	95057-790	37.09
Micro Ultrafine, 153.162 (6.03)*	89133-772	35.27

* Molded break point

New VWR® Sterilization Pouches



VWR Self Sealed Sterilization Pouches are made of surgical grade paper and blue film. They can be used for steam or ETO. They feature color-coded indicators on every pouch, easy to open lip closure, a prefolded self-adhesive strip, and flat seals to ensure seal integrity.



Size, cm (in.)	Cat. No.	Pack of 200	Case of/
13.3 x 25.4 (5¼ x 10)	89140-800	40.75	1,200/ 232.85
19.1 x 33 (7½ x 13)	89140-802	64.22	1,000/ 305.80
30.5 x 45.7 (12 x 18)	89140-804	171.67	400/ 326.98

VWR's Point-of-Care Testing Portfolio



VWR offers a wide variety of Point-of-Care Rapid Tests from respected brand names, allowing customers to choose the tests that best fit their needs. The VWR Healthcare team is here to make it easier to manage all of your patient testing needs.



Integra™ Miltex® Disposable Instruments



95039-086



95039-098



21909-140



95039-106



21909-670



21909-654

Description	Cat. No.	Price
Integra Miltex BiopBlade®, Sterile Biopsy Punch w/ Plunger	95039-086	Box 50/ 78.10
1.0mm w/ Plunger	95039-092	Box 25/ 100.11
1.5mm w/ Plunger	95039-094	Box 25/ 100.11
2.0mm w/ Plunger	95039-098	Box 25/ 100.11
3.0mm w/ Plunger	95039-100	Box 25/ 96.06
4.0mm w/ Plunger	95039-102	Box 25/ 96.06
Biopsy Punch, Standard		
1.0mm Diameter	95039-090	Box 50/ 108.14
1.5mm Diameter	95039-088	Box 50/ 108.14
2.0mm Diameter	21909-132	Box 50/ 108.06
2.5mm Diameter	95039-096	Box 50/ 108.14
3.0mm Diameter	21909-136	Box 50/ 108.06
3.5mm Diameter	21909-138	Box 50/ 108.06
4.0mm Diameter	21909-140	Box 50/ 108.06
5.0mm Diameter	21909-142	Box 50/ 108.06
6.0mm Diameter	21909-144	Box 50/ 108.06
8.0mm Diameter	21909-146	Box 50/ 108.06
Assorted Sizes (2, 3, 4, 5, & 6mm)	95039-104	10 Each/ 108.14

Description	Cat. No.	Price
Dermal Curettes		
2mm	95039-106	Box 50/ 118.72
3mm	95039-108	Box 50/ 118.72
4mm	95039-110	Box 50/ 118.72
5mm	95039-112	Box 50/ 118.72
7mm	95039-114	Box 50/ 118.72
Safety Scalpels		
Stainless Steel, Retractable Blade #10	21909-670	Box 10/ 32.82
Stainless Steel, Retractable Blade #11	21909-672	Box 10/ 32.82
Stainless Steel, Retractable Blade #15	21909-674	Box 10/ 32.82
Stainless Steel, Retractable Blade #15C	95039-116	Box 10/ 32.82
Standard Scalpels		
Stainless Steel, Sterile Blade #10	21909-654	Box 10/ 18.42
Stainless Steel, Sterile Blade #11	21909-656	Box 10/ 18.42
Stainless Steel, Sterile Blade #15	21909-660	Box 10/ 17.92
Knife Handle		
No. 3, Stainless Steel 5 in. Graduated in mm and cm. Fits blades 10-15C	21909-540	19.98
Carbon Steel Surgical Blades		
10	21909-610	Box 100/ 64.01
11	21909-612	Box 100/ 64.01
15	21909-618	Box 100/ 64.01
15C	21909-620	Box 100/ 118.03
Stainless Steel Surgical Blades		
10	21909-378	Box 100/ 64.01
11	21909-380	Box 100/ 64.01
15	21909-384	Box 100/ 64.01
15C (is an angled blade)	21909-642	Box 100/ 118.00

Special Offer

Buy 4 Get 1 Free! (Mix or Match)

Your choice of redeemed goods must be of equal or lesser value of lowest priced purchased item.

Visit www.vwrsp.com/LabVitalspromos to redeem this offer.

Expires 11/1/11, use promo Code 2999.

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LIMIT UNCERTAINTY

For more information on the complete collection of Integra™ Miltex® instruments available through VWR, visit vwr.com or call 800.932.5000.

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VWR® Contour™ Self-Skinned Urethane Chairs and Stools

- Easy to clean - resists moisture, stains, and damage
- Pneumatic seat-height adjustment
- Chairs include backrest that tilts with ventilating ribs and integral lumbar support
- Medium and high bench chairs and stools include adjustable-height footring



Description	Seat-Height Adjustment Range, cm (in.)	Cat. No.	Each
Chairs			
Desk Height	38.1-50.8 (15-20)	80086-436	380.85
Medium Bench Height	48.3-66 (19-26)	80086-438	419.13
High Bench Height	48.3-73.7 (19-29)	80086-440	432.59
Stools			
Desk Height	38.1-50.8 (15-20)	80086-430	330.14
Medium Bench Height	48.3-66 (19-26)	80086-432	380.85
High Bench Height	48.3-73.7 (19-29)	80086-434	405.69



80086-436



80086-432

ANTHRO: WE'RE ALL ABOUT CARTS



Microscope Table with Electric Lift
Cat. No. 97006-782, \$2449



Plate Reader Table
Cat. No. 11112-052, \$349



POC Cart
Cat. No. 97006-812, \$599

Anthro's mobile benches & carts are an affordable, easy-to-use alternative to built-ins. Contact your VWR Sales Representative at 800.932.5000 for more information on outfitting your labs!



Prevent Unsafe Airflow Inside Your Biosafety Cabinet

Purifier® Logic® Class II, Type A2 Biosafety Cabinets have a built-in electronically commutated motor, or ECM, which is programmed to precisely control the cabinet's airflow. The sensorless system uses a patent-pending technology called Constant Airflow Profile (CAP). CAP increases accuracy, reliability and the elimination of periodic recalibration of airflow sensors to ensure proper airflow.

- Airflow is maintained with only a 1-2 % difference in airflow as the HEPA filter loads
- ECM design is 60% more energy-efficient than other types of motors
- Operating parameters are constantly displayed on the LCD, including the percent of filter capacity remaining
- Programmable options permit users to define start up, shut down and standby parameters
- NSF Listed



For more information on other Purifier Logic Biosafety Cabinets, Base Stands and accessories in the REDISHIP program, please contact VWR at 800.932.5000.



The following products are in the VWR REDISHIP program and offer immediate shipment:

Description*	Cat. No.	Each
3 ft. Cabinet	97000-860	8,465.00
4 ft. Cabinet	97000-862	9,560.00
5 ft. Cabinet	97000-864	11,050.00
6 ft. Cabinet	97000-866	12,100.00

* All include 10 sash opening and one service fixture.

VWRCATALYST™

Industry Specific Services That Drive Productivity

Site Services

VWRCATALYST has committed to addressing the growing need for outsourced scientific services, so that you can remain focused on analysis. VWRCATALYST has achieved benchmark status in delivering scientific services solutions, such as media prep, clinical trials management, protein expressions, sample testing/validation, laboratory asset management, chemical shipping/receiving, glasswash, campus deliveries, gas cylinder-dry ice management, and other services solutions required by today's laboratories to maintain their competitive edge.

Business Process Consulting Services

LEAN methodology trained experts employ a recognized four-step process to help you uncover inefficiency, simplify processes, reduce costs, and meet aggressive deadlines.

Equipment & Instrument Services

ISO 9001 and ISO/IEC 17025 compliant team members and facilities provide validation, calibration, asset management, and compliance for diverse healthcare needs.



To learn more about VWRCATALYST contact your VWR Sales Representative at 888.793.2300 or visit us at www.vwrsp.com/VWRCATALYST.



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