

# THE BIOCHROM 30 AMINO ACID ANALYSIS SYSTEM

The gold standard dedicated Amino Acid Analyzer  
for *in vitro* diagnostic use and research



**biochrom**

"Our Biochrom 30 was installed in 2004, and we have been using amino acid analyzers from Biochrom for at least 10 years for patient and animal samples. We are a relatively busy laboratory and typically run approximately 1000 samples per year. We have been pleased with the performance since installation and would recommend it for the clinical environment"

Eamonn O'Driscoll, Biochemical Genetics Unit  
CAMBRIDGE UNIVERSITY HOSPITALS NHS FOUNDATION TRUST

## AMINO ACID ANALYSIS IN CLINICAL AND PHYSIOLOGICAL SAMPLES

Investigating metabolic disorders is a crucial and complex task. With over 42 clinically significant amino acids and their derivatives implicated in the clinical diagnosis and monitoring of Inborn Errors of Metabolism<sup>1</sup>, clinical laboratories need an accurate and reliable analysis system that delivers unequivocal results quickly.

The Biochrom 30 is the gold standard dedicated amino acid analyzer used by reference laboratories, hospitals, pharmaceutical and industrial labs worldwide. It allows users to accurately detect and quantify amino acids and their derivatives in complex physiological samples for both *in vitro* diagnostic use and research.

### QUALITY ANALYSIS

The Biochrom 30 is capable of separating up to 56 detectable physiological amino acids, derivatives and other compounds present in biological fluids including rare amino acids such as alloisoleucine, sulfcysteine, and argininosuccinic acid. It gives clear separations with precision (cv. <0.5%) and not only identifies peaks, but also quantifies them too. This gives important information to differentiate between metabolic disorders and does not need confirmatory identification on other systems.

### FIVE GOOD REASONS TO BUY A BIOCHROM 30 FOR CLINICAL ANALYSIS

- 1 THE GOLD STANDARD DEDICATED AMINO ACID ANALYSIS SYSTEM TRUSTED BY HOSPITALS AND REFERENCE LABORATORIES WORLDWIDE.
- 2 SUPERB ANALYSIS QUALITY. PRECISE, UNEQUIVOCAL PEAK IDENTIFICATION AND QUANTIFICATION-EVEN FOR RARE AND UNUSUAL MARKERS.
- 3 A COST EFFECTIVE SERVICE COMBINED WITH LOW COST MAINTENANCE
- 4 EASY TO USE AND MAINTAIN.
- 5 A TOTAL SYSTEM- INSTRUMENT, COLUMNS, SOFTWARE, READY-TO USE REAGENTS PLUS EXPERT SUPPORT FROM BIOCHROM- A COMPANY WITH 40 YEARS OF EXPERTISE IN AMINO ACID ANALYSIS





# amino acid analyzers

## A DEDICATED SYSTEM

The Biochrom 30 is fully automated with an 84 position cooled autosampler. It is designed to operate 24/7 and ideal for busy clinical and research labs. Analysis times can be tailored to the laboratory's requirement, for example, the PKU column enables plasma samples to be screened in just 10 minutes. This compact instrument can handle plasma, serum, urine, dried blood spots and CSF without costly and time-consuming re-equilibration.

## COST EFFECTIVE

The Biochrom 30 is a cost effective solution for amino acid analysis because it has a long column life-designed to last the life of the instrument. With our unique column cleaning and re-packing service you can reduce costs further. There is a full range of competitively priced ready to use reagents that saves preparation time and minimizes variation. All reagents are stable at room temperature to minimize wastage.

## EASY TO USE

The Biochrom 30 has pre-defined analytical, processing and reporting methods in the software as well as dedicated technical support, training and installation to get your lab up and running quickly.

## PEACE OF MIND

The Biochrom 30 is backed by a dedicated technical and engineering support team. Our applications team can help with full screening methods or specific short methods from our application database built over many years. Our service contract package gives complete peace of mind and includes:

- Two maintenance visits per year performed by trained and certified Biochrom field service engineers.
- Biochrom quality parts used for all maintenance and repairs.
- Priority service from our engineering team.

For more than 40 years, Biochrom has been supporting consultants, pediatricians and clinical experts throughout the world by providing a complete package for amino acid analysis, from instrumentation and chemical kits, to customer training courses and user group meetings.



## THE BIOCHROM 30 CLINICAL AND PHYSIOLOGICAL SYSTEM

### A CHROMATOGRAPHIC SYSTEM SPECIFICALLY FOR AMINO ACIDS

The Biochrom 30 Amino Acid Analyzer is a cation exchange chromatography system coupled with a highly specific detection system using post column derivatization with ninhydrin. Amino acids are separated according to their net charge determined by the pKa of their ionized groups. The mobile phase is a finely tuned set of 5 lithium citrate buffers used in a stepwise elution profile of increasing pH and molarity. A temperature gradient on the column maximizes resolution. Lithium hydroxide solution regenerates the resin bed online after each run cycle.

### HIGHLY SPECIFIC DETECTION SYSTEM

The ninhydrin method is highly specific because it reacts only with amino groups giving a compound absorbing at 570nm wavelength (440nm for amino acids like proline). This response is a linear relationship between the absorbance and the amount of amino acid in the sample. The sensitivity of the ninhydrin reaction is optimized for clinical use and the response is 100% linear within the expected amino acids concentration range encountered in clinical samples. The only sample preparation needed is a simple deproteinization-filtration step. The continuous flow of reagent ensures a reproducible derivatization giving high precision in the peak area.



### THE BIOCHROM 30 AMINO ACID ANALYSIS SYSTEM

- Biochrom 30 Analyzer with refrigerated autosampler
- Choice of column (with top-up resin)
- Starter pack of ready to use reagents
- Spare parts and consumables kit
- HP Computer and 17" monitor, HP printer, Windows XP PRO and all cables
- Biosys software and Ezchrom Elite 1 data handling software
- Manuals and qualification & performance verification Logbook
- Off site customer training

### ROBUST AND STABLE CHEMISTRY

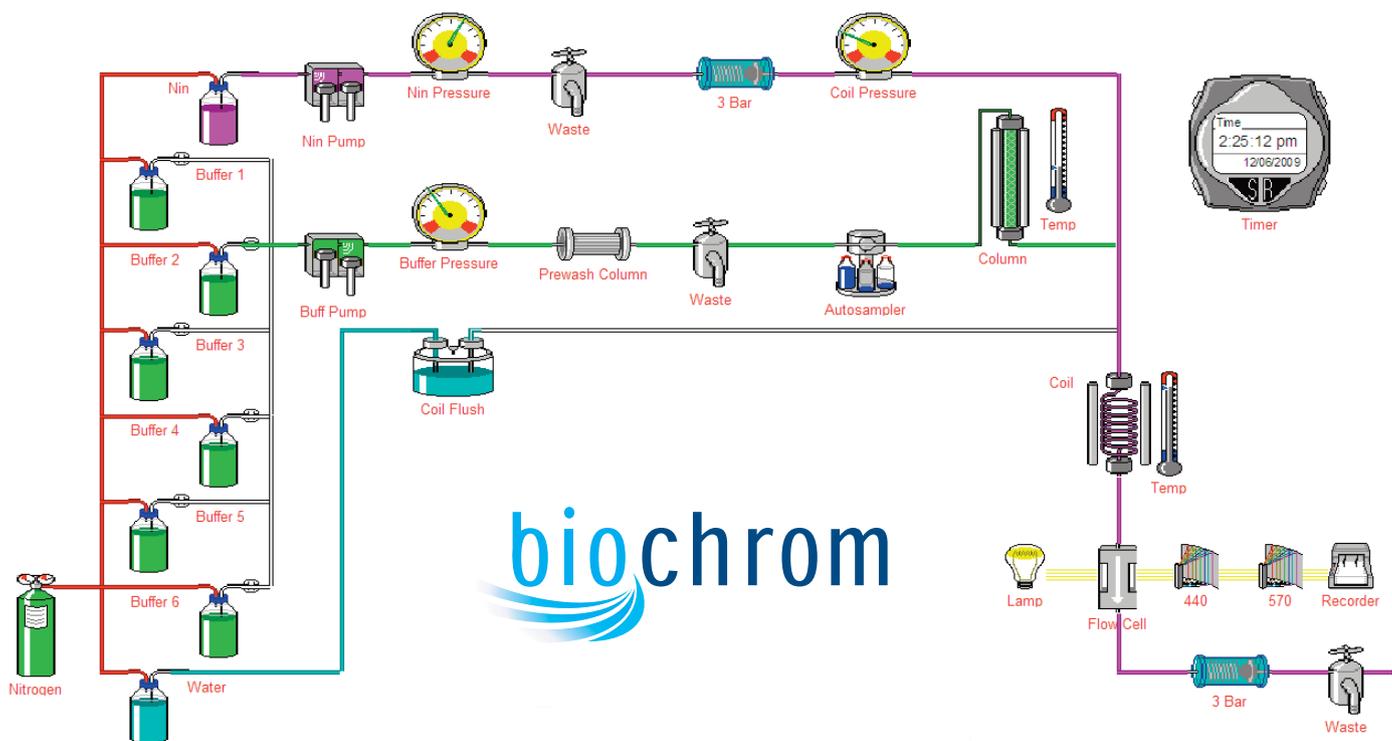
The chemical kit contains everything you need for routine analysis of up to 260 runs (high speed method). Chemicals are available either as complete analysis kits or as individual buffers and consumables to enable continuity of analysis. All reagents are stable at room temperature and guaranteed to give accurate and reproducible results with a 3 year shelf life. On the instrument, buffers and reagents are stored under an inert gas to ensure stability.



### CHOICE OF RE-USABLE COLUMNS

- High Speed Column - for rapid full screening
  - High Performance Column - the standard reference
  - High Resolution Column - for maximum separation
  - PKU Column - for rapid screening.
- Manufactured from PEEK material, the columns are free from corrosion and metal contamination and are packed with optimally sized cation exchange resin. The columns are attached with finger-tight fittings so no special spanners are required to ensure a leak-free seal. All our columns are fully tested and optimized under strict QC criteria. To minimize waste and reduce costs, our columns are fully recyclable at the end of their life thanks to our unique repacking and cleaning service.

# amino acid analyzers



biochrom

## SOFTWARE

Biochrom BioSys software controls the system via an advanced graphical user interface showing real time operational information and fully is integrated with the data-handling software EZChrom Elite™ from Agilent. This user-friendly, intuitive software is easily networked for secure data storage and includes special tools for compliance with regulatory demands, e.g. FDA 21CFR11. It offers a wide variety of functions in setup of methods and sequences, data processing and visualization plus compilation of custom reports. Data can be exported easily to other programs or other Windows applications. Other chromatography systems use this

software so its familiarity may increase efficiency and help to reduce user-training costs.

## QUALITY

The Biochrom 30 System is certified for *in vitro* diagnostic use. Biochrom reagents are manufactured from high quality materials under the ISO 9001 Quality System and subjected to rigorous control procedures. Biochrom was the first Amino Acid Analyzer manufacturer to achieve *in vitro* diagnostic certification for its PKU diagnostic reagents as part of the company's approval under the ISO 13485:2003 standard.

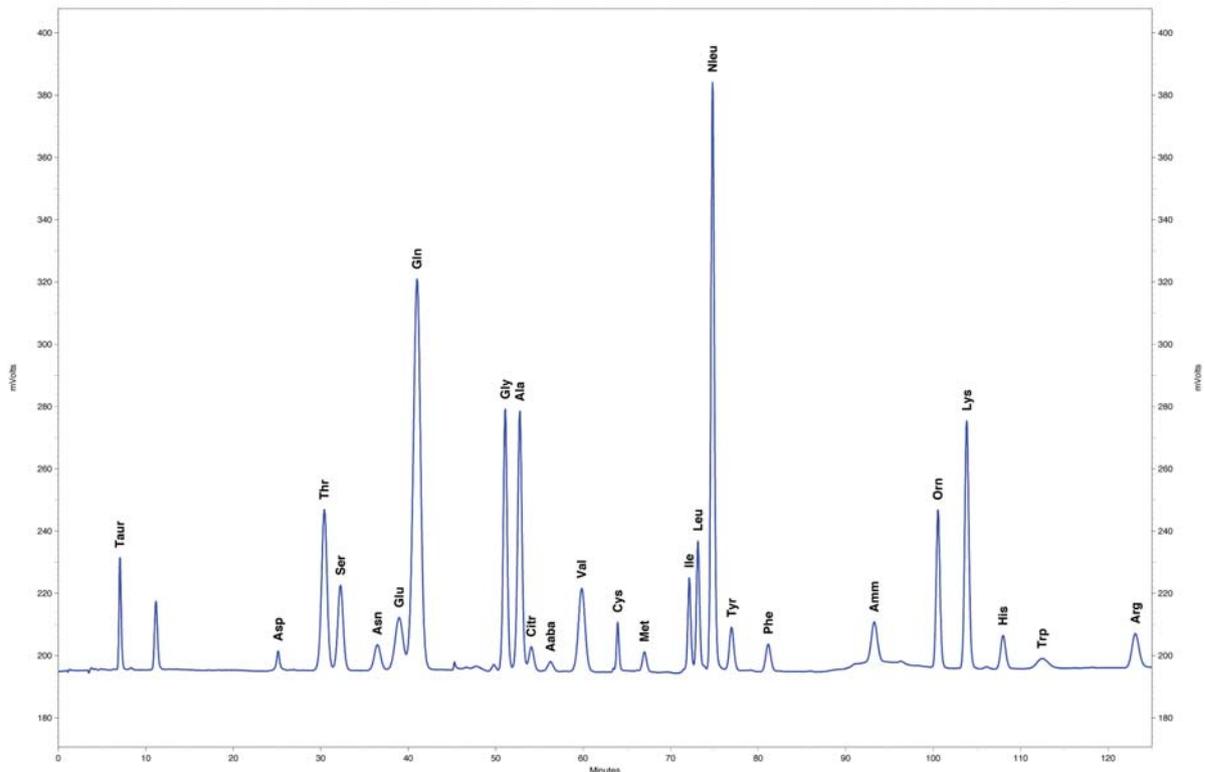


“ Our Biochemical Genetics laboratory had the privilege of purchasing the first Biochrom Amino Acid Analyzer in the United States. We have been a Biochrom customer for 10 years and have since purchased a second system. We have been very impressed with the outstanding service Biochrom has continually provided. The analyzers are reliable, rugged, and consistently produce high quality data that enables us to report accurate results for inborn metabolic diseases.”

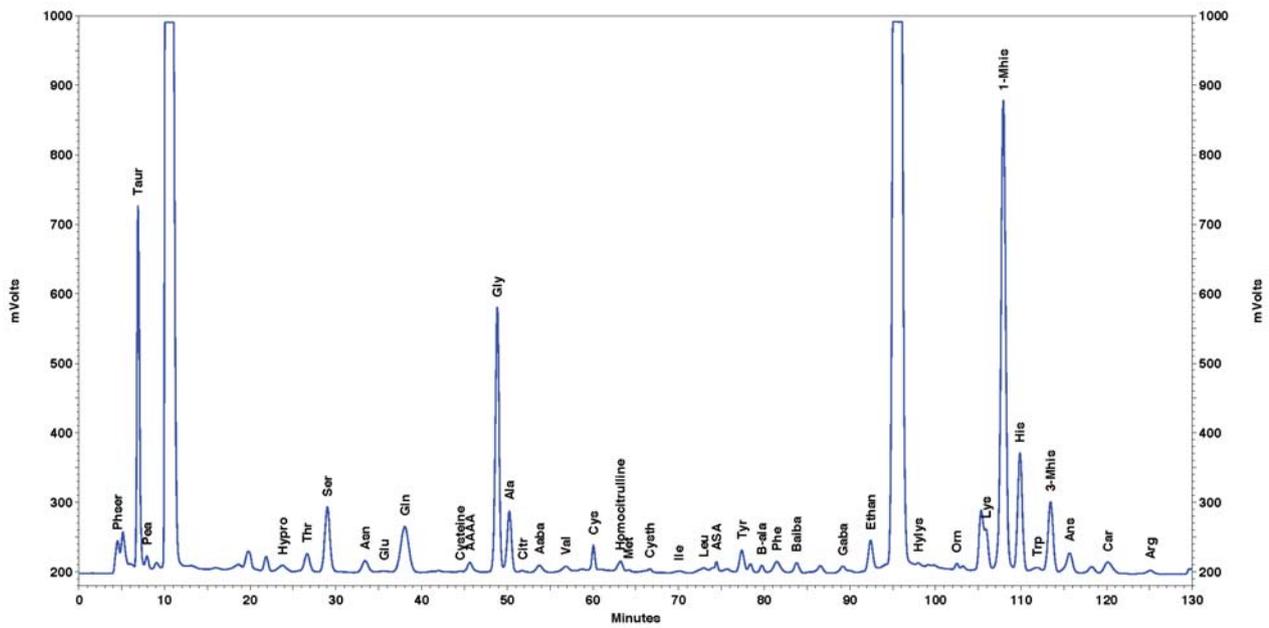
Erin T. Strovel, Ph.D., F.A.C.M.G.  
Director Pediatric Biochemical Genetics Laboratory  
Assistant Professor of Pediatrics  
UNIVERSITY OF MARYLAND

## CLINICAL ANALYSIS

The Biochrom 30 enables you to recognize a characteristic amino acid chromatographic profile to aid the diagnosis. The quantification of the amino acids may indicate the severity of the abnormality detected. For reference purposes, chromatograms of normal plasma and urine samples are shown.



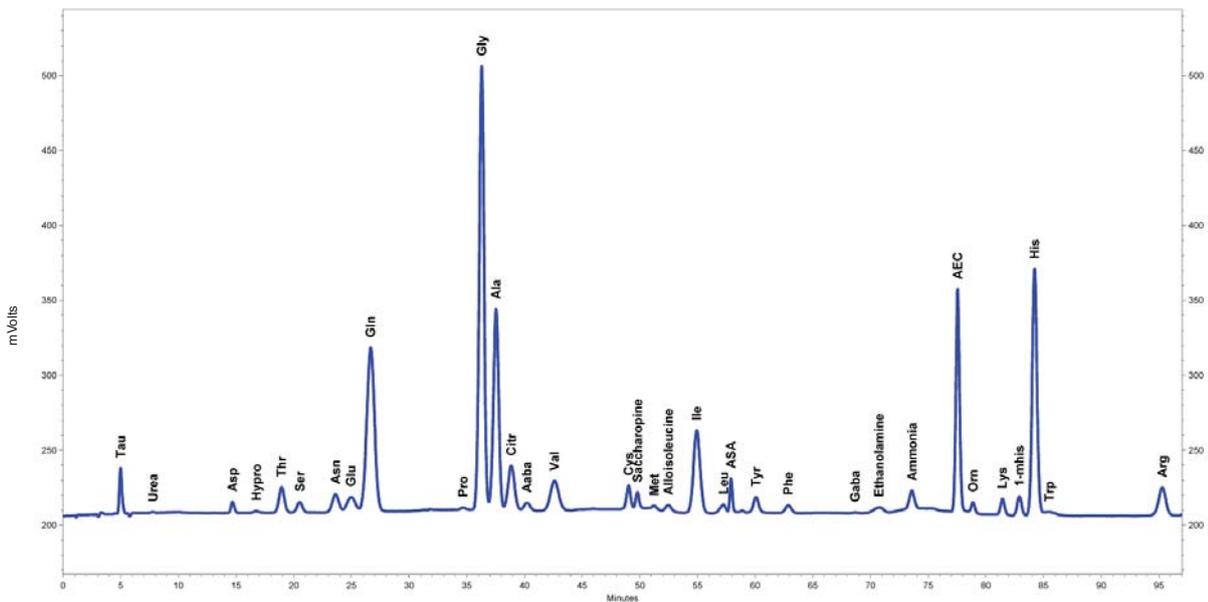
Normal Plasma sample analyzed on the Biochrom 30 High Performance Column.



Urine sample analyzed on the Biochrom 30 High Performance Column.

## ACCELERATED ANALYSIS

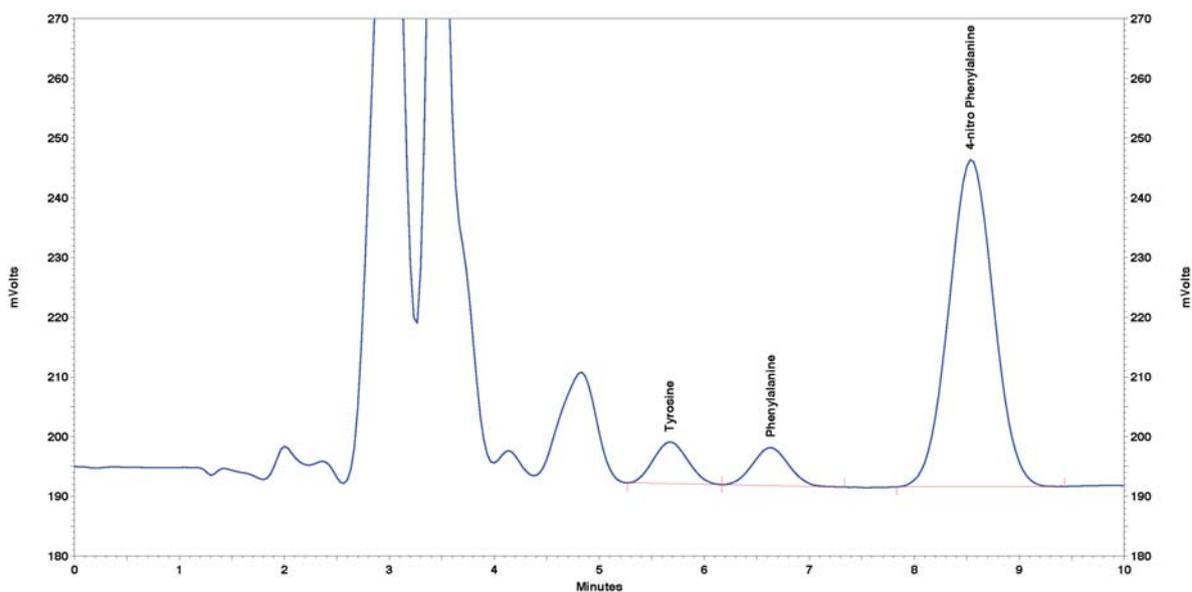
A full screening is achievable in less than 2 hours (injection to injection) in physiological samples with the High Speed Column. Rare key markers are clearly separated as shown in the plasma sample below.



Plasma sample spiked with saccharopine, alloisoleucine and argininosuccinic acid.

## PHENYLKETONURIA (PKU)

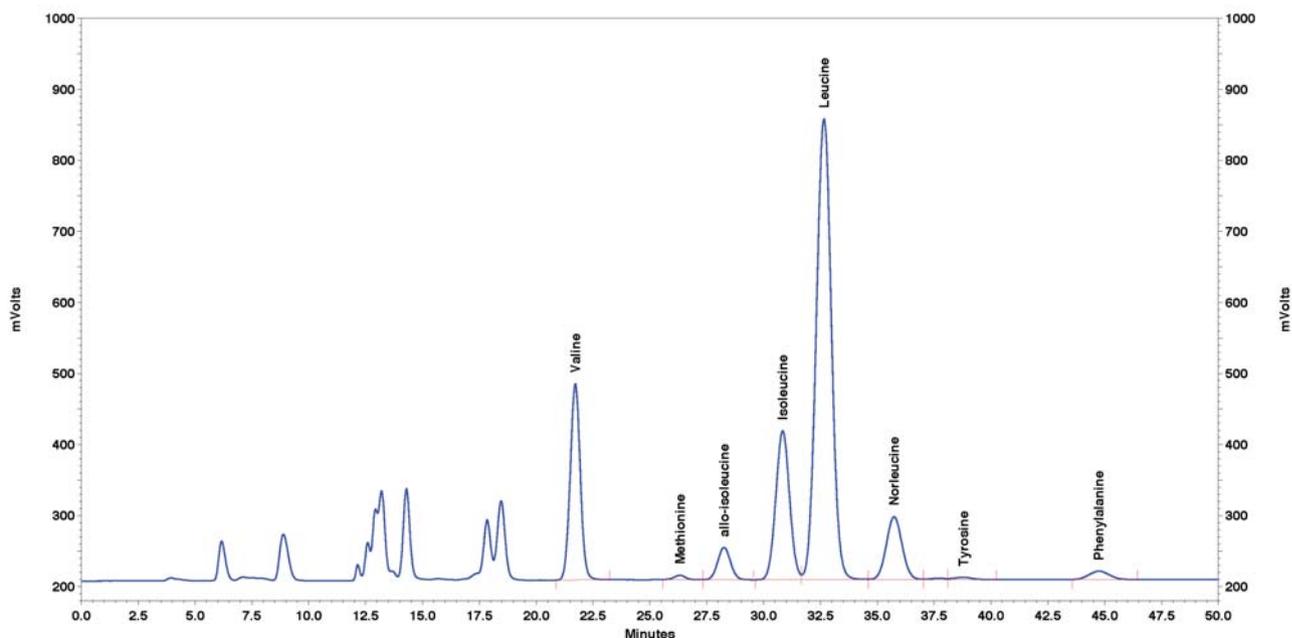
The PKU column is designed specifically for PKU newborn screening and to monitor patients' phenylalanine levels in plasma. Samples can be analyzed within 10 minutes with an injection-to-injection repeat time of 15 min. The method is compatible with dried blood spot samples and gives cost effective PKU screening service compared to expensive and high maintenance methods such as tandem Mass Spec.



Normal plasma sample analyzed on a Biochrom 30 equipped with the PKU column. 4-Nitrophenylalanine used as the internal standard.

## MAPLE SYRUP URINE DISEASE (MSUD)

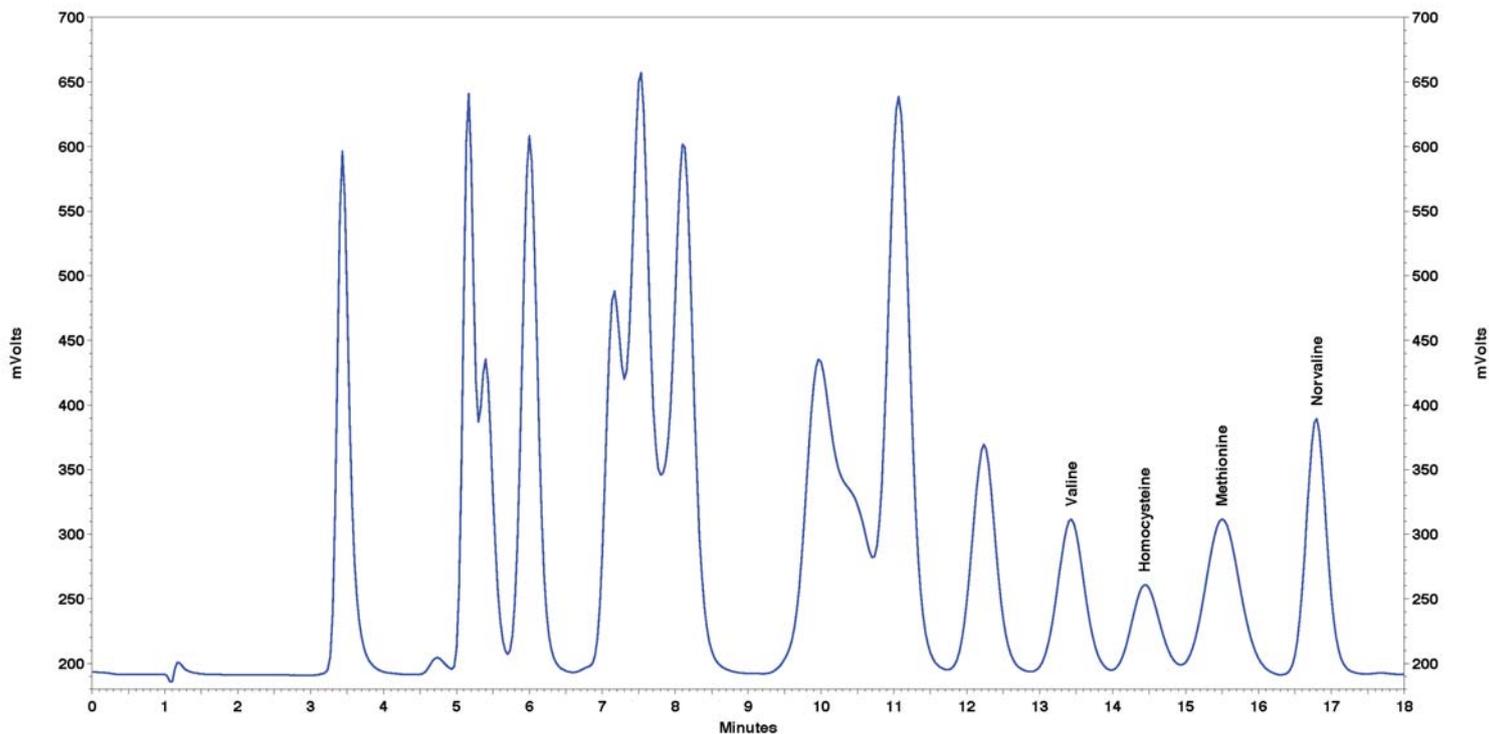
Maple Syrup Urine Disease (MSUD) can be diagnosed by the presence of alloisoleucine combined with high amounts of leucine, isoleucine and valine<sup>2</sup>. The Biochrom 30 separates fully isoleucine, leucine and alloisoleucine enabling a clear diagnosis.



MSUD patient sample analyzed with the MSUD short method. Data kindly provided by Tanyalcin Laboratory, Turkey.

## TOTAL HOMOCYSTEINE ASSAY

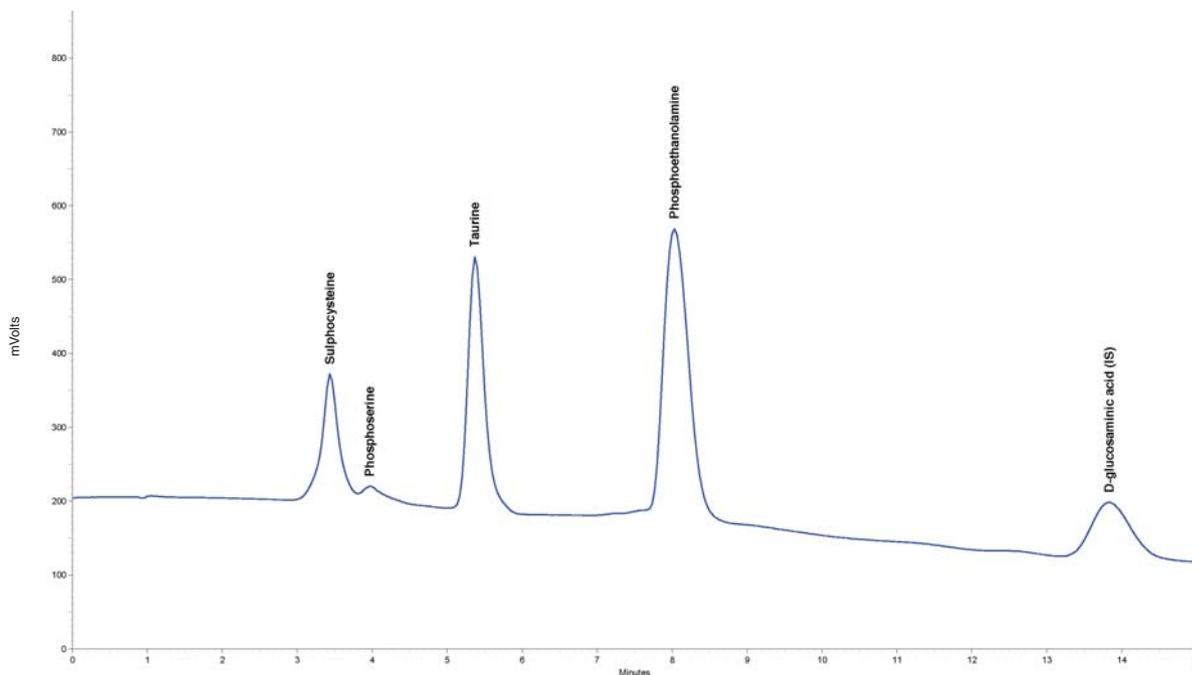
Elevated plasma total homocysteine has emerged as an important risk factor in the development of vascular disease<sup>3</sup>. Using the Biochrom 30 Amino Acid Analyzer reduces analysis time to 24 min injection to injection for evaluation of patients at risk.



Physiological standard spiked with homocysteine. Norvaline is used as the internal standard.

## SULFOCYSTEINE

Sulfite oxidase deficiency is a rare inborn error of metabolism, characterized by elevated urinary s-sulfoysteine<sup>2</sup>. Using the Biochrom 30 Amino Acid Analyzer, a short programme for the analysis of s-sulfoysteine has been developed that allow its separation from phosphoserine.



Patient sample urine sulfocysteine. Data kindly provided by St James Hospital, Leeds UK.

## BIOCHROM 30 TECHNICAL SPECIFICATIONS

Reproducibility on retention times	Better than 0.1% CV	
Reproducibility on peak area	Better than 0.5% CV at 500µM	
Limit of detection	9 - 15 pmoles	
Time of analysis (based on the separation of 45 physiological amino acids):	PKU Analysis:	15 min injection to injection
	High Speed analysis:	115 min injection to injection
	High Performance analysis:	170 min injection to injection
Analytical column:	High specification and high performance column; High pressure PEEK 200mm x 4.6mm ID packed with 9µm cation exchange resin. Column temperature: controlled by Peltier elements. Range 20°C-99°C (1°C increment)	
Operating pressures:	Buffers:	2280psi max (145bar)
	Ninhydrin:	353psi max (24bar)
	Reaction coil:	176psi max (12bar)
Flow rates:	Buffers:	5 to 132mL/h
	Ninhydrin:	5 to 50mL/h
Eluent system:	6 buffer system (5+1 regeneration solution) stored on the instrument at room temperature in graduated 1L glass bottles under nitrogen pressure. Ninhydrin reagent: Stored on the instrument at room temperature under nitrogen pressure in a 2L plastic coated glass bottle.	
Reaction coil:	Temperature controlled at 135 °C in silicone oil.	
Photometric detection:	Single flow cell with optical beam splitter. Dual channel detection at 440nm and 570nm.	
Autosampler:	84 sample position refrigerated carousel. Sample volume from 1µL to 200µL. 3 injection modes available.	
Software:	BioSys Instrument Control software. EZChrom Elite Integration software. A/D conversion	
Dimensions and weights:	Main unit:	48x59x57 cm, 18.9x23.2x22.4 inches (wxdxh)
	Weight:	90Kg, 198lbs
	Autosampler:	30x50x34 cm, 11.8x19.7x13.4 inches (wxdxh)
	Operating temperature:	15 °C to 25 °C
	Maximum humidity:	80% at 25 °C
Required services:	Oxygen free nitrogen gas (99.99%) regulated to 73.5psi (5bar). Drainage facility. 240V/100V, 50Hz/60Hz, 300VA mains supply.	
Safety System	Automatic shut-down in the event of: photometer lamp failure, incorrect ninhydrin / buffer / coil / nitrogen pressures, incorrect coil and column temperatures. Automatic instrument flush.	
Order Code	Biochrom 30 Physiological System 80 - 2111 - 00 - SYS	

ELUTION ORDER OF CLINICALLY SIGNIFICANT AMINO ACIDS AND DERIVATIVES ANALYZED BY THE BIOCHROM 30

1	Sulfocysteine
2	Phosphoserine
3	Taurine
4	Phosphoethanolamine
5	Urea
6	Aspartic acid
7	Hydroxyproline
8	Methionine sulfone
9	Threonine
10	Serine
11	Asparagine
12	Glutamic acid
13	Glutamine
14	Sarcosine
15	Cysteine
16	$\alpha$ -Aminoadipic acid
17	Proline
18	Glycine
19	Alanine
20	Citrulline
21	$\alpha$ -Aminobutyric acid
22	Valine
23	Homocysteine
24	Cystine
25	Saccharopine
26	Pipecolic acid
27	Homocitrulline
28	Methionine
29	Cystathionine
30	Allolsoleucine
31	Isoleucine
32	Leucine
33	Argininosuccinic acid
34	NorLeucine
35	Cysteine-homocysteine mixed disulfide
36	Tyrosine
37	$\beta$ -alanine
38	Phenylalanine
39	$\delta$ -Aminolevulinic acid
40	$\beta$ -Aminoisobutyric acid
41	Homocystine
42	$\gamma$ -Aminobutyric acid
43	Ethanolamine
44	Ammonia
45	Hydroxylysine
46	Amino Ethyl Cysteine
47	Ornithine
48	Lysine
49	1-Methyl histidine
50	Histidine
51	Tryptophan
52	3-Methyl histidine
53	Anserine
54	Carnosine
55	Arginine
56	Homoarginine

ABOUT BIOCHROM

Biochrom is a world leader in amino acid analysis. The Biochrom 30 is recognized as the gold standard dedicated amino acid analyzer used by hospitals, pharmaceutical and industrial labs worldwide. Applications are available both for clinical analysis and screening of metabolic disorders, for drug synthesis, infusion fluids and for industrial applications in food, beverage and feedstuffs.

Biochrom is a leading manufacturer of scientific instruments with over 40 year's experience. The Biochrom Group consists of five well-known instrument brands covering amino acid analysis, UV/Vis spectroscopy, and microplate instrumentation. Hospitals and laboratories worldwide trust our products and we are a valued OEM partner of many of the world's finest scientific instrumentation companies. The Biochrom spectroscopy range includes the Novaspec, Ultrospec, and GeneQuant, plus the Libra and WPA brands. Biochrom also manufactures two major brand names in the microplate instrumentation market - Asys and Anthos.

All our instruments are available through a growing global network of independent distributors, backed by our commitment to customer support. Biochrom is a Harvard Bioscience Company.

EZChrom Elite is a trademark of Agilent Technologies  
 Windows is a trademark of Microsoft  
 HP is a trademark of Hewlett Packard

<sup>1</sup> Differential diagnosis of (inherited) amino acid metabolism or transport disorders. W. Blom & J.G.M.Huijmans, Amino Acids (1992) 2:25-67

<sup>2</sup> Vademecum Metabolicum Manual of Paediatrics. J. Zschocke & G. Hoffmann, 2ed. Milupa GmbH 2004

<sup>3</sup> Rapid Analysis of Homocysteine Levels. A.Lolia & S. Bee, Biochrom Application note B30.5.



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