NEUROTRANSMITTER LAB TESTING
an overview

Optimizing Group outcomes
in the treatment of neurotransmitter dysfunction
with amino acid therapy.

Neurotransmitter Unification
Theory of Medicine
(Linking over 60 diseases together in medicine)

www.NeuroReplete.com
THE LAB
We are pleased to announce affiliation with:

DBS Labs
8723 Falcon St.
Duluth, MN 55808
Phone: 1-877-476-7229

Neurotransmitter sample collection kits can be obtained by calling DBS Labs.

Nutrition Dynamics @ Ph. 800-444-9998 is the only authorized distributor for the complete line of NeuroResearch amino acid formulas. These patent and patent-pending products are produced from the highest quality nutrients and under strict manufacturing quality controls of NeuroResearch to assure consistency and excellence in production of:

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<tr>
<th>NeuroReplete</th>
<th>D5</th>
<th>CysReplete</th>
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<tbody>
<tr>
<td>RepleteExtra</td>
<td>D5 Extra</td>
<td>D5 Mucuna</td>
</tr>
</tbody>
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For information product information Call 877-626-2220

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Optimizing group outcomes with amino acid therapy with and without laboratory testing has worldwide patents pending and is the intellectual property of NeuroResearch. Other intellectual property of NeuroResearch includes U.S. patents 6,384,088, 6,403,657, 6,548,551 and patents pending.
NEURORESEARCH
OUR BACKGROUND

Years ago we had become frustrated treating patients with neurotransmitter illnesses whose drugs had quit working during treatment. In an effort to deal with the problem, we developed our first patented process on the use of amino acids to keep prescription drugs such as weight loss drugs, SSRI medications, SNRI medications and a host of other neurotransmitter active drugs functioning.

We then took our research further and developed our patented process to essentially “get rid of the drugs” and use our amino acid therapy formulas only.

We now have worldwide patent applications on, “optimizing group results in the treatment of neurotransmitter dysfunction with or without laboratory testing”. Methods outlined in the NeuroResearch patents and patent applications provide for pinpoint accuracy in managing neurotransmitter levels of the catecholamine and serotonin system, which according to our research functions as one system.

OVERVIEW OF NEUROTRANSMITTER TESTING

Neurotransmitter testing is not a direct assay or measurement of the amount of neurotransmitters in a sample. The following is a discussion of the patent pending process calibrated by NeuroResearch in the use of neurotransmitter testing in clinical practice.

The half-life of norepinephrine and epinephrine is 1.5 minutes and extreme fluctuations in systemic neurotransmitter levels can occur if the subject is subjected to outside stimulus. Pitfalls of the various methods for direct assay of neurotransmitter levels are briefly discussed as follows.

Direct measurement of neurotransmitter levels in the urine is unreliable due to variance that exists in the dilution of specific gravity of the urine.

Direct measurement of the neurotransmitter levels of saliva are unreliable due to the variance in dilution of saliva and minute to minute variability in levels of neurotransmitters in the system as reflected in spot samples of saliva. Serial samples of saliva (3 to 6) obtained over a 20 to 30 minute period of time have the ability to compensate for minute-to-minute spikes in systemic neurotransmitter levels, but will not compensate for variance in dilution properly.

The technique of serum neurotransmitter sample collection is too cumbersome to be of practical value in a day-to-day clinical practice. Direct measurement of neurotransmitter in serum or platelets is difficult due to the minute-to-minute variability of neurotransmitters in the system. You can overcome this by introducing a catheter into the circulatory system and waiting 30 minutes without disturbing the patient. At this point a sample is drawn, again without disturbing the patient. The very act of venipuncture can cause neurotransmitters to spike.

CALL NEURORESEARCH AT 877-626-2220
FOR EDUCATIONAL RESOURCES
URINARY NEUROTRANSMITTER TESTING

Under the NeuroResearch patents pending and approved, we discuss methods for obtaining valid neurotransmitter testing results from serum (blood), saliva, and urine. The preferred method of sampling is urinary samples with the following conditions and considerations.

To compensate for dilution or specific gravity of the urine, the use of the “neurotransmitter/creatinine ratio” is employed. Labs in Germany and the U.S. reportedly had been trying to calibrate a ratio such as this to give clinical meaningful results for five years or more. With the use of the NeuroResearch clinical database and the assistance of over 50 clinics using NeuroResearch techniques, the basic initial calibrations of this type of laboratory testing was completed in approximately four months in 2001.

The “neurotransmitter/creatinine ratio” gives the ability to compensate for urinary dilution or specific gravity. It also functions to give an average of the neurotransmitter levels in the system as reflected in the urine for the period of the last 2 to 3 hours since the bladder was emptied. This average of the “neurotransmitter/creatinine ratio” is much like a hemoglobin A1C in diabetes and overcomes the minute-to-minute rapid changes in the system allowing for meaningful results to be obtained.

TESTING CONSIDERATIONS

Laboratory testing of all types used in a clinic is primarily for one of two purposes:
1. To assist in making or confirming a diagnosis.
2. To assist in treatment.

There have been no correlations made in the use of neurotransmitter testing in diagnosis of disease. Due to the huge variability of states that can lead to dysfunction, neurotransmitter testing diagnostic criteria does not exist. This is discussed further in-depth in the new booklet that will be available April 1, 2003 titled, “Neurotransmitters in-depth”.

Any disease or illness relating to neurotransmitter dysfunction should be diagnosed by traditional diagnostic criteria. Neurotransmitter testing has no value in determining the starting point in treatment with amino acids. These protocols are based on the database and clinical experience and were refined from the standpoint of, “optimizing group results in the treatment of amino acids”.

In the work of NeuroResearch, it was verified with statistical database analysis that there is no predictive value to lab testing or other observations regarding the amino acid dosing a patient will ultimately need in treatment and the starting state. The exception was for patients with a history of neurotoxic exposure to specific substances. As a group, they needed more amino acids to achieve resolution of symptoms than those that have not been exposed to neurotoxins in the past.
THERAPEUTIC RANGES

The primary indication for neurotransmitter testing is to help establish a “therapeutic range” in treatment. The ranges are as follows:

<table>
<thead>
<tr>
<th>Neurotransmitter</th>
<th>Non-obesity (micrograms)</th>
<th>Obesity (micrograms)</th>
</tr>
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<tbody>
<tr>
<td>Serotonin</td>
<td>800 to 1,200</td>
<td>1,200 to 2,400</td>
</tr>
<tr>
<td>Dopamine</td>
<td>300 to 500</td>
<td>400 to 600</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>40 to 75</td>
<td>40 to 75</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>5 to 13</td>
<td>5 to 13</td>
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DISCUSSION OF NEUROTRANSMITTER TESTING INDICATIONS

VERIFICATION OF EFFECTIVE TREATMENT IN PLACE

In the rare case, we have seen patients with symptoms that did not resolve when the therapeutic levels of neurotransmitters in the urine were obtained. In which case, the caregiver with confidence could look for other causes of the problem.

TESTING IN HIGHER DOSE AMINO ACID THERAPY

Neurotransmitter testing is indicated in patients under treatment who are still experiencing problems with symptoms associated with neurotransmitter dysfunction at the “8 and 8” level:

1. Taking 8 pills of NeuroReplete and 8 pills of RepleteExtra or;
2. Taking 8 pills of D5 and 8 pills of D5 Extra.

If consideration is being given to increasing the dosing of amino acids above these levels, neurotransmitter testing should be obtained first to insure that the increase is indeed needed and the system will not be overloaded by the increase.

STRUGGLING PATIENTS

In patients who have been doing well for several weeks or months, who then begin to struggle and experience return of symptoms, the first step in management is to have the patient journal (write down all pills taken) for one week. After one week, the patient is re-evaluated and if the patient is still struggling, a neurotransmitter test is indicated to assist in the treatment plan. In-clinic experience shows about 95% of patients who are struggling and return after one-week of journaling pills have no further problems.

TESTING AT THE DISCRETION OF THE CAREGIVER

Ordering testing at the discretion of the caregiver is not to be over looked here or minimized. In the work leading up to the NeuroResearch patents, we have seen families with very unusual neurotransmitter patterns, patients who are interested in the effects of long term drugs such as SSRIs or other medications that deplete neurotransmitters, etc. All of this is at the discretion of the caregiver and a discussion of unusual laboratory results is found in the booklet, “Neurotransmitter testing and amino acid therapy.”
Hyperexcretion

There are many reasons why the value of neurotransmitter testing in diagnosis is limited at this time. The database work of NeuroResearch indicates that as many as 23.7% of patients not under treatment (N=402) experience hyperexcretion of neurotransmitters during the day. The following is a discussion of hyperexcretion, one of the mechanisms of action leading to neurotransmitter dysfunction.

In an individual who has not been under treatment before and at the start of treatment a neurotransmitter test is obtained which shows elevated neurotransmitter levels in the urine, the problem is “hyperexcretion” of neurotransmitters by the kidneys which in turn does not correlate with systemic neurotransmitter levels. In the case of hyperexcretion, the kidneys are spilling out neurotransmitters and depleting the system. The mechanism of this is unknown.

It is thought that hyperexcretion is a phase on the road to complete adrenal burnout as illustrated below and on the following page.

Correlations at Initiation of Treatment

There are many reasons why the urinary neurotransmitter levels do not correlate with systemic levels at initial testing. This in turn makes urinary neurotransmitter testing unreliable as a diagnostic tool.

The illustration on the following page shows how urinary levels of neurotransmitter correlates with systemic levels as adrenal burnout progresses, giving unreliable initial results. In studying the illustration, it is apparent that high, normal, or low urinary neurotransmitter in the face of low systemic levels of neurotransmitter can exist.

The only true correlation we have seen is with therapeutic ranges in patients under treatment with amino acids.

Amino acid therapy when properly administered has the ability to treat and deal with all mechanisms of neurotransmitter dysfunction.
Systemic and urinary neurotransmitter levels in adrenal burnout.

The patient as adrenal burnout progresses over the months.

ADRENAL BURN OUT/ HYPEREXCRETION

Why initial testing does not correlate with systemic levels in hyperexcretion.

Urinary Neurotransmitter levels

HIGH
NORMAL
LOW

Time period

Systemic neurotransmitter levels
COLLECTION OF SAMPLES

Urine neurotransmitter samples should be collected at 4 or 5 PM in the day. This is the time of day when neurotransmitters are at their lowest. Use the sample containers provided by the laboratory. They have a preservative in them to stabilize sample during shipping or mailing.

CONSIDERATIONS OF SAMPLE COLLECTION

As with traditional collection of samples where there is a variance in the laboratory testing results returned in samples that were collected throughout the day, there is a diurnal variation to neurotransmitter levels obtained throughout the day with a peak and trough. The following illustrates this variation.

DIURNAL NEUROTRANSMITTER VARIATION

Typical diurnal variation of urinary neurotransmitter levels.

Levels of neurotransmitter on getting up

Peaks about 11 AM

Low point about 4 or 5 PM (Around 5 to 6 hours before bed).

Neurotransmitters rise later in the evening and during sleep.
SAMPLE COLLECTION CONSIDERATIONS

DISCUSSION OF THE ILLUSTRATION ON PREVIOUS PAGE

Using standard medical considerations as to when the optimal time is to obtain a urinary neurotransmitter level gives the following considerations.

1. The most meaningful urinary testing of neurotransmitters is carried out at 4 or 5 in the evening, or around 5 to 6 hours before bed in shift works when the trough (lowest) levels are present.

2. Peak (highest) levels do not apply here, since with proper therapy based on lab testing, neurotransmitter levels later in the day can still drop below the levels needed to keep symptoms of neurotransmitter dysfunction under control.

3. The goal of treatment is to treat the patient so that the levels do not drop below the level needed to keep symptoms of dysfunction under control.

Based on the peak and trough considerations of the diurnal variation of urinary neurotransmitter levels, **Morning urinary neurotransmitter measurements are of very little therapeutic value.**
Optimizing group outcomes using amino acid therapy with or without laboratory testing in the treatment of neurotransmitter dysfunction is the intellectual property of NeuroResearch with worldwide patents and patents pending.

COST OF NEUROTRANSMITTER TESTING

The urinary neurotransmitter test panel consists of and is reported as milligrams of neurotransmitter per gram creatinine.

1. Serotonin
2. Norepinephrine
3. Epinephrine
4. Dopamine

The cost of the panel: Contact clinic NeuroResearch receives no monies from lab sales

Laboratory testing meets standards established by NeuroResearch.

NeuroResearch controlled quality assurance in clinical applications

No shipping of labs overseas leading to 3 and 4 week turn around times.

Technical support of lab testing is by NeuroResearch licensed caregivers with over 25 years to total in-clinic patient care experience treating patients with amino acid therapy and neurotransmitter testing.

In no case will laboratory personnel attempt to give patient treatment advise. Clinically trained licensed professionals of NeuroResearch handle all patient treatment support.

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NeuroResearch Seminars

NeuroResearch offers 2-day training seminars on the treatment of neurotransmitters diseases. Attending a NeuroResearch training seminar is a valuable addition to your practice. At the conclusion of the seminar, you will understand the correlation of central and peripheral neurotransmitter metabolism and how to use laboratory results to guide you in “amino acid therapy” with monitoring of your patient’s progress.

You will also gain insight into ways to efficiently integrate neurotransmitter support into your practice and to maximize your practice potential.

Although clinics may obtain NeuroResearch products and services without attending a seminar, the seminar experience is strongly recommended. NeuroResearch has never seen one successful program that was not trained in seminar. Clinics that have attended a NeuroResearch seminar have 20 to 30 times more patients and revenues than those clinics that have not been trained in a seminar.

For seminar info go to www.neuroreplete.com

Educational Resources and Support
Available Monday thru Friday at 877-626-2220

In addition to the seminars, NeuroResearch offers support with an e-mail stream, telephone technical support, monthly newsletters, and educational materials.

Each week, NeuroResearch receives between 100 and 200 email from clinics and programs looking for assistance and information. Of the emails that we receive, we select 8 to 10 that appear to be of better educational value and send them out via our e-mail stream to all healthcare providers who have registered their email address with us. At present the e-mail stream is going out to over 700 clinics, physicians, and programs. The educational value here cannot be understated.

You can also receive personalized clinical support from NeuroResearch that is only a toll-free phone call away at 877-626-2220. We offer only the highest quality professional technical support for the treatment of neurotransmitter dysfunction with amino acids with or without neurotransmitter testing. Our staff of licensed medical caregivers has a total of over 25 years of front line medical practice experience in treating patients with amino acid therapy and they are willing to freely give your practice the support it needs. You also will have the ability with our licensed health care providers to assist you in all issues including prescription medication dosing issues.

You can access our licensed physicians for practice support via e-mail: info2@neuroreplete.com

Our professional assistance is backed up by the largest front line neurotransmitter dysfunction database that we know of.

This support comes from NeuroResearch, the developer and owner of worldwide patents and patents pending on, “Neurotransmitter testing in amino acid therapy to optimize group results in the treatment of neurotransmitter dysfunction”
Need for training

For optimal results in group treatment using amino acid therapy with or without laboratory testing, training is needed. We have never seen a successful program that did not attend a seminar first. Each year NeuroResearch conducts ten two-day training seminars around the United States.

NeuroResearch seminars
second half 2003

Aug. 16 and 17, 2003 → Houston
Sep. 20 and 21, 2003 → Chicago
Oct. 4 and 5, 2003 → Orlando
Oct. 25 and 26, 2003 → Los Angeles
Nov. 15 and 16, 2003 → Minneapolis

For more information go to our web site:
www.neuroreplete.com
Or call
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