



Phone: 828-505-2664

Fax: 828-505-2560

www.avorahealth.com

1000 Centre Park Drive Asheville, NC 28805

The Ebb & Flow of GyroStim AMARC with VTS

By Kim Fox, DPT

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I heard a wonderful speaker, a physician from Brazil, talking about tinnitus and the mismatch between research (lack of conclusive evidence) and clinical practice (various unproven clinical treatments working for different people), quote Albert Einstein, "The mind that opens to a new idea never returns to its original size."

The GyroStim is an automated, multi-axis, rotational chair (AMARC), which moves from very slow speeds to very fast speeds, now offered with a visual targeting system (VTS). The VTS involves the placement of 4 electronic, stationary targets around the perimeter. The individual attempts to hit the targets with a laser pointer while in motion. The VTS encourages activity that promotes calibration between the vestibular (inner ears), proprioceptive (information received via our muscles and joints) and visual systems. The computer software tracks a person's performance by identifying when and how many targets are hit. Regardless if someone feels fine during treatment, if their ability to hit targets is below acceptable limits, the speed of movement and/or level of challenge is not increased until the individual is trained through practice and habituation to maximize their performance. The GyroStim AMARC with VTS is designed to provide incremental challenges according to an individual's purpose and response to training. With the ability to qualitatively and quantitatively track responses for every individual during every session, the clinical operator is provided with a clear picture of performance, allowing the clinician to provide maximum training effectiveness while avoiding over-stimulation.

In our clinic, we also utilize a joystick, which may be used by the participant seated in the GyroStim AMARC or by the clinical operator, for an additional level of precisely controlled movement. The joystick allows the ability to control pitch (front to back) or yaw (side to side) or both axes of motion simultaneously, direction of rotation, acceleration, deceleration, duration, velocity as well as the ability to start and stop movement at will in any position. The clinician can additionally set limits, allowing the participant control within specific parameters.

An additional component to training utilizing our AMARC with VTS involves added cognitive tasks, such as rhyming words, reading words placed on the targets, or holding 2 laser pointers, one in each hand, and, on command, changing which hand is shooting at targets. Moving through real life requires the ability to be mobile without having to focus on your mobility, allowing cognitive processing to take center stage. The AMARC with VTS allows us to uniquely work on reflex and reaction time training, requiring speed of movement without unnecessary tension (something which many people need to train to improve), combined with spatial awareness and cognitive processing to provide highly challenging (and fun) treatment. Combined with the proper knowledge and skill of the right medical provider relative to the individual's condition, we have been able to progress individuals farther and faster than we could with traditional therapy alone (This statement is based on my 27 years in the physical therapy profession in both civilian and military clinics).

Our GyroStim AMARC with VTS sessions are approximately 40 minutes. Each session is made up of individual runs. A "run" is generally 30 to 60 seconds of movement in the AMARC while identifying electronic targets placed around the perimeter and hitting the targets with a laser point. Runs can be shorter or longer in duration as necessary according to tolerance and purpose of training. Each run is separated with at least one minute, longer as necessary, of rest (no motion and for some people the added practice of mindfulness) to allow adequate recovery from the stimulation and to allow the operator time to assess the individual's response to the stimulation and plan for the next run. During the rest period, clinical instruction is provided to not only maximize recovery but to educate the individual how to improve their performance. The intensity of the next run may be reduced, repeated or progressed according to individual performance, response, and tolerance of the preceding run.

It has been reported in the literature, which a prominent Neuro-otologist in Chicago, Dr. Timothy Hain, MD, has compared to GyroStim, that pitch (moving in the vertical plane as if nodding “yes”) while rotating around earth’s axis (Raphan, 1983 and 1999) is a powerful source of motion sickness. These two cited studies, done 19 and 35 years ago, do **not** parallel how a human being begins or is trained in the GyroStim AMARC with VTS, which involves training of the visual, proprioceptive and vestibular systems through habituation. Neither study replicates how movement is delivered, how the AMARC with VTS combines body movement with freedom of head movement spotting targets, nor how a human being is trained to perform better. Both studies were performed on monkeys. One study moved monkeys while in the dark (Raphan 1983), which is certainly not the case while training in the AMARC with VTS. In the second study from 1999, monkeys were implanted with coils in their eyes and surgically underwent canal plugging which involves entering the inner ear and altering the anatomy. Bolts were used to hold their heads in place during movement. Morphine and antibiotics were administered to the monkeys to reduce post-operative pain and infection. To generate pitch while rotating, the monkeys were rotated continuously in one direction in the yaw plane for 80 seconds at speeds varying from 30 to 120 degrees per second and simultaneously pitched 20-40 degrees. The GyroStim AMARC, in contrast, begins at 6 degrees per second, not even close to 30 deg/sec let alone 120 deg/sec. The GyroStim AMARC has the option to move exclusively in 1 plane, not 2 as done in the study. Introducing a second plane of motion may be a different speed (i.e. slower) as well as a different degree (i.e. smaller) amount of movement until the individual is appropriate to progress. In the study, the monkeys’ heads were physically bolted into place, restricting freedom of movement and forcing a persistent, directionally fixed corrective eye movement. The AMARC we use does not fixate the individuals head in place. In fact, in combination with the VTS, it is designed to encourage freedom of head movement in all directions, including moving the head in the opposite direction of body movement while working to focus on a stationary target around the perimeter, much like a ballerina spots a fixed point.

Our method of training in the GyroStim AMARC with VTS begins with slow and tolerable motions for a brief amount of time in one direction, then the AMARC decelerates, stops, and accelerates slowly in the opposite direction. We begin as slow as 1 revolution per minute (RPM) in the yaw plane, while using a laser pointer to hit stationary targets set up around the perimeter. This is equivalent to sitting in an office chair and taking a full minute to make one complete turn while looking at up to 4 stationary items equally spaced 90 degrees apart on the office walls. The speed of 1 RPM, equating to 6 degrees per second in a single plane of movement, is not exactly what I would call a roller coaster ride! I’ve yet to meet anyone that was unable to tolerate this rate of movement. At the point where a person has progressed through training to move in the AMARC with VTS at 30 degrees per second, the direction of movement typically changes at 12 seconds and, if combined with pitch, the amount of pitch, speed of pitch and, change in pitch motion can all be controlled separately. All aspects of movement, from the direction, speed, change of direction, acceleration rate, and deceleration rate can all be modified according to purpose, tolerance and performance. Many individuals, typically athletes and others with high levels of sensory and motor training, will reach speeds equivalent to or greater than 120 degrees per second without any motion sickness. It is likely that **without proper training**, most people (as well as animals I suppose) could experience motion sickness if they were moved at continuously fast speeds or when moving much at all immediate post-surgery while taking morphine and antibiotics, as was the case in the study using monkeys. If we choose to pull literature from 1999, Dr. Haslwanter, from the Department of Neurology, University Hospital Tübingen, Germany, indeed found differences between monkeys and humans during pitch while rotating around earth’s axis.

Nearly all people (I don’t know about monkeys), with guided practice, will be able to condition to faster movements and combinations of movements while spotting stationary targets. This is the process of habituation training. Unlike monkeys, human beings can quantify and articulate their response to the stimulation which can be used to maximize training effectiveness. In 2005, Yen Pik Sang et al., stated that the use of graded stimuli to enable faster recoveries and maintenance of a positive psychological attitude to therapy may help avoid motion sensitivity. Training in the AMARC is progressed through graded stimuli and a positive mindset is always reinforced in our clinic.

AMARC with VTS training is not just about rotating in space but rather calibrating vestibular, visual and proprioceptive cues to help you locate where you are relative to the constant pull of gravity, a necessary skill in daily life. Humans can be trained to improve balance and reduce motion sensitivity. As humans, we have to be able to pitch and rotate our head at the same time, as is the case when turning around to look at something on a high or low shelf in the grocery store, walking in the city and turning the corner while looking up at traffic signals or tall buildings then looking down to the curb, and we

certainly perform repeated turning combined with up and down (pitch) head movements well beyond 20 - 40 degrees in just about every sport.

What is typically seen on the internet are videos posted by individuals who are proud to have progressed to faster speeds and combinations of movement. The operative word here is “progressed.” What you don’t see are their previous training sessions with much slower rotational speeds. While I have never met Dorothy Hamill (1976 world champion ice skater), I’m sure that she did not go onto the ice and start spinning in a circle 25 times in a row while tipping her head back looking up at the ceiling. I think it is safe to say that she began with a ½ turn, then progressed to a full turn, and so on. In my practice, motion sensitivity is one of the easiest symptoms to resolve using the GyroStim AMARC with VTS. “Habituation offers the surest counter measure to motion sickness. Habituation is superior to anti-motion sickness drugs, and it is free of side effects (Cowings, 2000).” For rehabilitative clinicians that have attempted to treat motion sensitivity, we know that it can be very laborious training requiring long-term dedication by the individual as improvements are typically slow to evolve. We have additionally learned that athletes with pre-existing motion sensitivity who sustain concussions are more likely to develop post-concussion syndrome compared to their fellow athletes with no prior motion sensitivity (Sady, 2011; Kontos, 2016). There is no doubt that training in our AMARC with VTS for most people has been enjoyable and even fun, and we have seen motion sensitivity resolve more rapidly than traditional therapy. After my training in our AMARC with VTS, I personally can now read in a moving vehicle as a passenger which I have not been able to do without feeling sick in over 25 years and I can even fly on a turbulent flight without symptoms.

While the GyroStim has the capability to move someone through inversion (an abundant of literature exists showing the benefits of inversion), not everyone is appropriate to invert, such as those with uncontrolled high blood pressure, significantly large abdominal girth, wet macular degeneration, and insulin resistant diabetes, to name a few. There are also conditions which should preclude AMARC treatment, such as ankylosing spondylosis, pregnancy, high or low intracranial pressure, undiagnosed neck pain or stiffness, detached retina, and untreated sleep apnea.

As of 2018, GyroStim has been in use over the last 10 years. The first GyroStim was installed in 2008 at the Air Force Academy. The following year a GyroStim was installed at the Mayo clinic for aerospace medical research. The first clinical application was put in place in 2010. In 2011, public interest increased after the GyroStim was used to successfully treat Sidney Crosby, a professional ice hockey player, for post-concussion syndrome which had not resolved through traditional treatment. Shortly following, GyroStim systems were being purchased largely by Chiropractic clinics. There are now approximately 30 units around the world, 20 of them in the United States, placed in a mix of clinical practices but still largely Chiropractic offices. While it has been proclaimed by some to be capable of treating nearly anything and everything, we should keep in mind it is a tool, like anything else, to facilitate or compliment healing and assist in maximizing performance, however, despite the many clinical success stories, these claims have yet to be scientifically validated in the literature. Discounting the relevance and effectiveness of AMARC with VTS because many are used by Chiropractic Neurologists (these professionals are Doctors of Chiropractic, DC, not Neurologists, MD) with claims to resolve a host of different problems and because most (but not all) are charging a lot of money is no different than me complaining about the many MD’s that still prescribe Meclizine for either Benign Paroxysmal Positional Vertigo (BPPV) or a peripheral vestibular disorder when documented clinical guidelines for Family Practice Physicians (FPP), Neurologists, Otolaryngologists and Vestibular Rehabilitation Guidelines clearly state that Meclizine is not recommended. In fact, Meclizine taken for a peripheral vestibular disorder actually inhibits recovery, so the prescribing physician is doing more harm than good. Additionally, published in the Journal of the American Medical Association (JAMA) in 2015, long-term use of anticholinergic medication, such as Meclizine, has been linked to dementia (Gray, et al). Despite the direct comparison of this study to how Meclizine is currently being prescribed by some providers, I see many patients that have been taking Meclizine for many years. Regardless of the absence or wealth of available literature, the reality is that there are good and bad in every profession.

Despite the lack of published research, much like the rush to purchase a Louisville slugger baseball bat, success stories following GyroStim AMARC training tends to create a wave of interest. The Louisville slugger baseball bat was made by a teenager in Louisville Kentucky in 1884. After a professional baseball player, Pete Browning (aka the Louisville slugger), who was in a hitting slump, broke his bat, he tried the teenager’s hand-crafted baseball bat and the no-hitter streak was over! Baseball players then flocked to buy the Louisville slugger baseball bat. Was it the bat that made the difference? Was it psychological? It didn’t matter. It worked and that is all that people cared about. People with conditions that fail to

improve with traditional measures who find results with the GyroStim AMARC with VTS often stimulate a stampede of excitement in those that are in the same predicament. That is what happened with a patient diagnosed with Mal de Debarquement Syndrome (MdDS), after suffering with this debilitating condition despite traditional therapies, experienced resolution of symptoms for the first time in 10 years following treatment in the GyroStim AMARC with VTS. Unlike medications, which have long lists of side effects (you've heard the commercials, read the inserts and likely have experienced side effects from medications you have taken), the only side effect experienced with this individual was fatigue during treatment which resolved upon completion, unless you count improved quality of life, improved balance as quantitatively assessed, reported resolution of depression and anxiety, increased happiness, and the ability to now participate in both daily and recreational activities as side effects. It would not be a true statement to say that all participants respond this way, however, very reasonable to say in the last year that it has been more common to see improvements than not. While there are a few researchers dedicated to exploring MdDS, there is very little literature to support definitive treatments. Do we give up and not do anything for these patients? Do we bad mouth an unproven treatment that appears to have potential? Even the research community recognizes unproven therapies as a reasonable choice when "proven" treatments have failed to work. Even congress now recognizes experimental treatments using medications (which inherently all have side effects, some which are very serious such as death) with a new bill, 'Right to Try', which has passed both the House and Senate and awaiting presidential signature to sign into law. Right to Try allows terminally ill patients to seek drug treatments that are still in clinical trial and that have not been fully approved by the US Food and Drug Administration (FDA, USFDA). No one should enter into experimental treatment lightly or blindly. It is the responsibility of the clinician providing any form of treatment, experimental or otherwise, to educate and inform the public of known pros and cons as well as the possibility of unknowns. I have been informed that the GyroStim is in the process of seeking FDA approval.

I have approached several large universities about collaborating for research and was told, "while it looks interesting, there is a lack of empirical data, therefore, 'we' cannot validate doing research." That translates to "there currently is no research, therefore, we are not going to do research." There are many barriers to research in private practice, for starters, unlike hospitals and universities, a private practice is not affiliated with an Institutional Review Board (IRB). IRB approval is a requirement for research and reputable journals will not publish research without completing the IRB process, resulting in a significant lack of "published" research. At a significantly higher cost, a private practice could pay a public IRB but this is usually cost prohibitive. Private practices do not receive federal or state funding, and do not have their own grant writers like hospitals and universities. For those highly profitable private practices making a lot of money from GyroStim treatments who decline to consider research, then, to me, it is obvious where their interests lie. Speaking for my private practice, where we still treat patients one at a time, employ all advanced degree providers, do not inflate the cost of the GyroStim AMARC with VTS, and provide care that is mostly insurance based which does not yield high profits, we have limited financial resources. Despite this, we are still in the process moving forward with research regardless of the many obstacles. University and hospital researchers are very skilled at what they do, seeing that it is usually the majority of or all of what they do; differing from a full-time clinician. Clinical providers rely on the researchers to validate clinical treatments; however, clinicians outside of these settings do not have a say in what is researched. There are still times, unfortunately, despite surmountable evidence in the literature validating a test or treatment when insurance companies may still refuse to reimburse a test or treatment, continuing to call it "investigational", as is the case with Blue Cross Blue Shield, declining to cover computerized dynamic posturography (CDP) testing, despite nearly 50 years of published evidence.

Anecdotally, I have seen difficult to explain improvements, which I would never claim to treat or cure, such as improved speech, resolution of tinnitus and improved static vision. While results vary, more common improvements that have been observed in my clinic are reduction or resolution of motion sickness, improved balance, improved gait speed, improved ability to look around while walking, improved reaction times (which is imperative for fall prevention in seniors and a typical goal for athletes), report of improved sleep patterns, report of reduced anxiety, report of reduced over-stimulation from busy environments, reduction or resolution of brain fog, and improved mental clarity. These were patients that did not have a full recovery through traditional therapies and opted to give AMARC with VTS a try.

I do believe in research methods, serving to protect the public, and I am moving forward with research to help validate the GyroStim AMARC with VTS as evidence-based medicine. There is little doubt, however, that there is a disconnect between published research and clinical knowledge not yet proven by science. I no sooner agree with the providers that

claim that GyroStim is a cure-all for everything, then I do with those that can't fathom the idea that it may actually work...and work without making someone vomit. To this I will end with another quote by Albert Einstein, "Great spirits have always encountered violent opposition from mediocre minds."

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Citations

Cowings, P.S., Toscano, W.B., Autogenic-feedback training exercise is superior to promethazine for control of motion sickness symptoms. J. Clin. Pharmacol. 2000;40, 1154–1165.

Gray, SL, et al. Cumulative Use of Strong Anticholinergic Medications and Incident of Dementia. JAMA Intern Med. 2015; 175(3): 401-407.

Haslwanter T, et al. Otolith-canal interaction during pitch while rotating. Ann N Y Acad Sci. 1999; 28;871:410-3.

Kontos, A.P., et al, Reliability and Associated Risk Factors for Performance on the Vestibular/Ocular Motor Screening (VOMS) Tool in Healthy Collegiate Athletes. Am J Sports Med. 2016 Jun;44(6):1400-6.

Raphan, T., et al. Nystagmus generated by sinusoidal pitch while rotating. Brain Res. 1983;276(1): 165-172.

Raphan, T., et al. Canal and otolith afferent activity underlying eye velocity responses to pitching while rotating. Ann N Y Acad Sci 1999;871: 181-194.

Sady, MD et al. School and the concussed youth: recommendations for concussion education and management. Phys Med Rehabil Clin N Am. 2011 Nov;22(4):701-19, ix.

Yen Pik Sang, et al. Effect of a novel motion desensitization training regime and controlled breathing on habituation to motion sickness. Percept. Mot. Skills. 2005;101, 244–256.