

# Introduction

## November 2013

# Introduction

- About us – Who we are, Where we are
- Neurofeedback History & Evidence Base
- What is Neurofeedback ?
- Our Neurofeedback Training Approach
- Questions

# About us

- **Stuart Black – Founder**

- Chartered Engineer, Change Management Consultant
- 3 yrs Bupa Cromwell Hospital Executive Director to Nov 2012



- **Zuzana Kovacova – NF Practitioner Herts**

- MA (Psych), MBPsS, LNCP
- Existing Bio/Neurofeedback practitioner in Hertfordshire



- **Charlotte Keizer – NF Practitioner Surrey, London**

- (Educational) Psychologist, MSc Pedagogical Sciences/ Orthopedagogy, HCPC Registered, background working with children with Neuropsychiatric disturbances



- **Christina Merryfield – Dietician/Nutritionist**

- BSc Nutrition and Dietetics, Diploma Reflexology
- Lead Dietician at Cromwell Hospital, private practice in Harley Street



- **Approach based on that developed by EEG info**

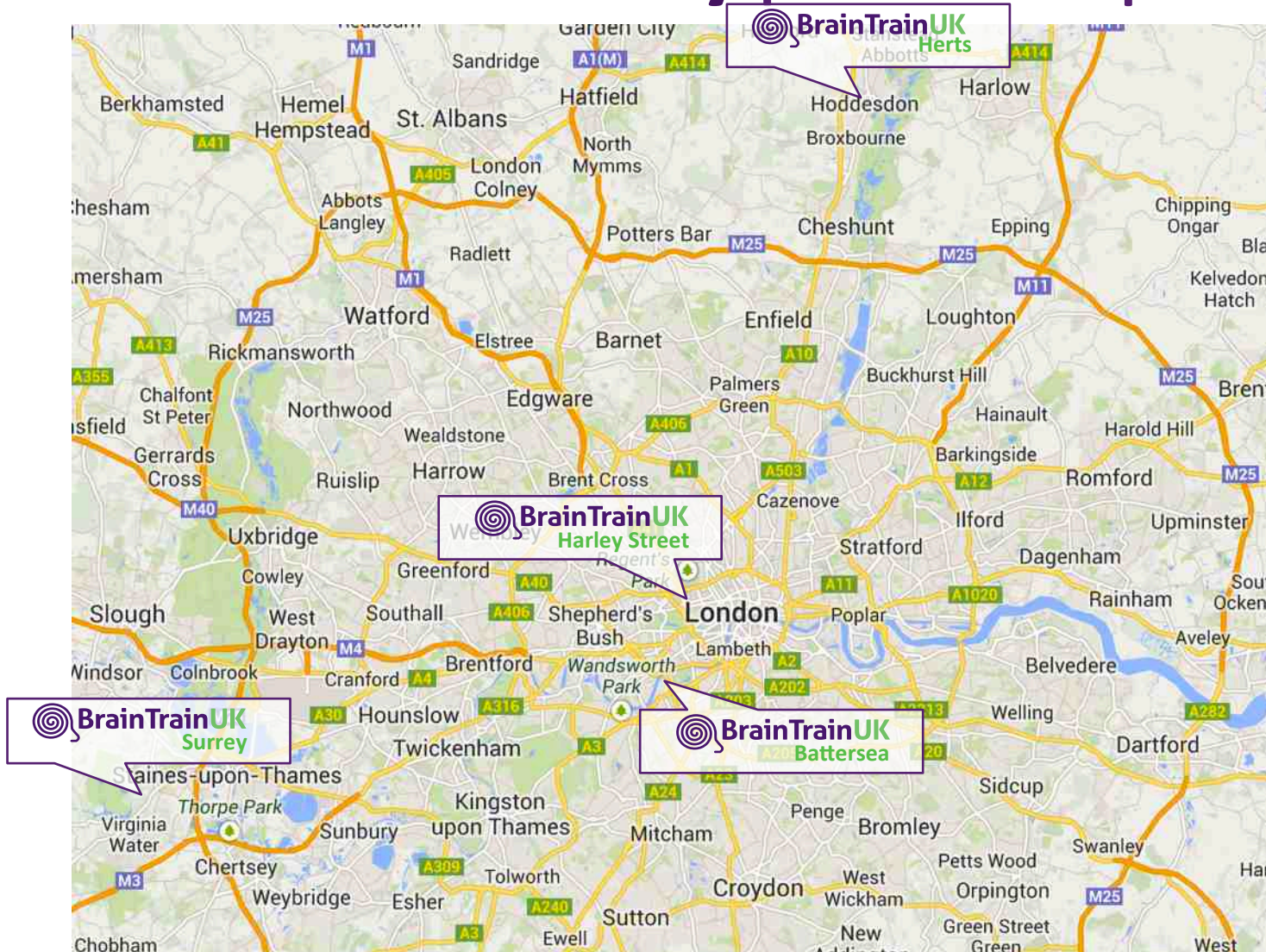
- been delivered through training, equipment and clinical practice for 22 years



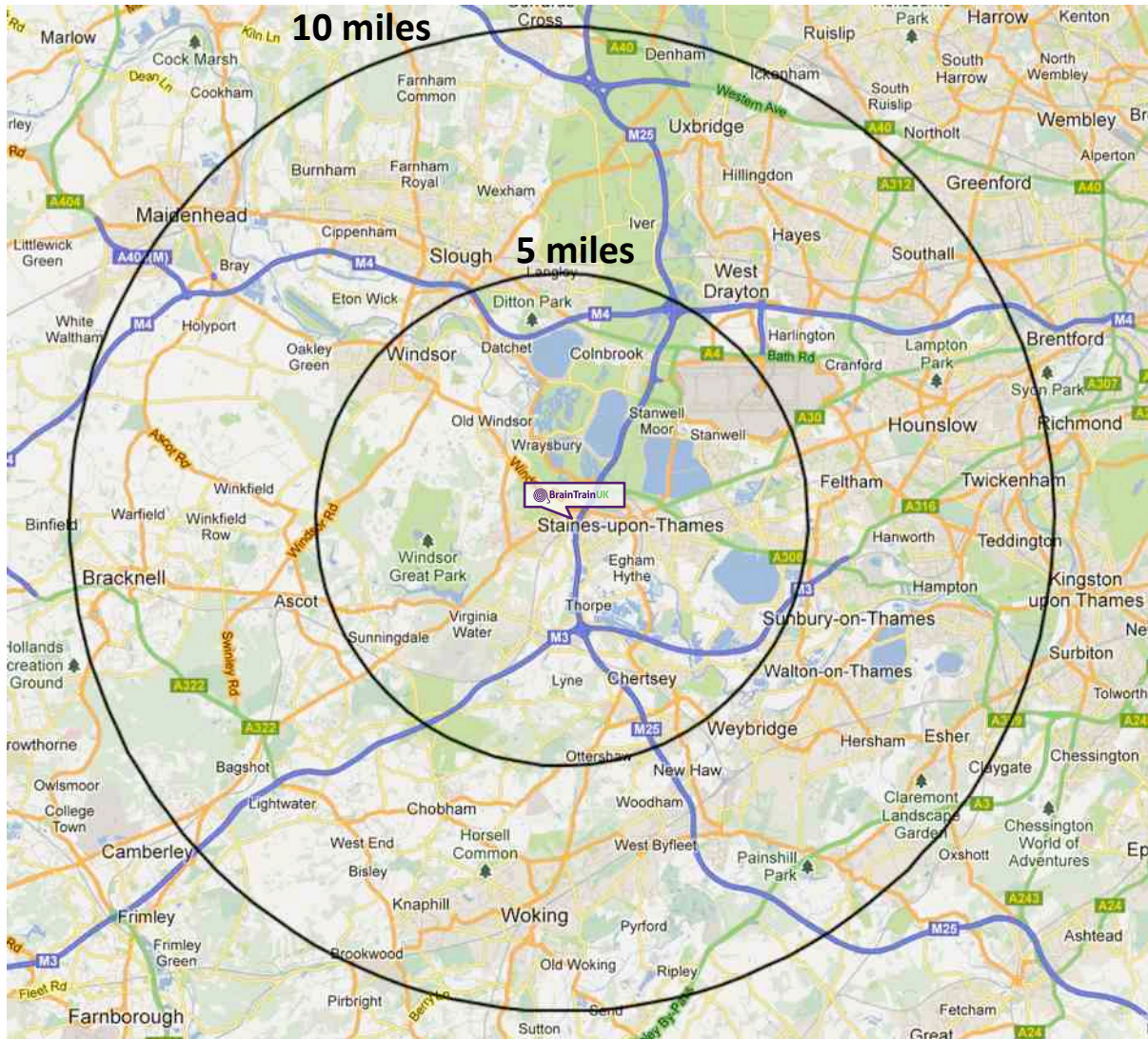
# Locations using BTUK method – USA



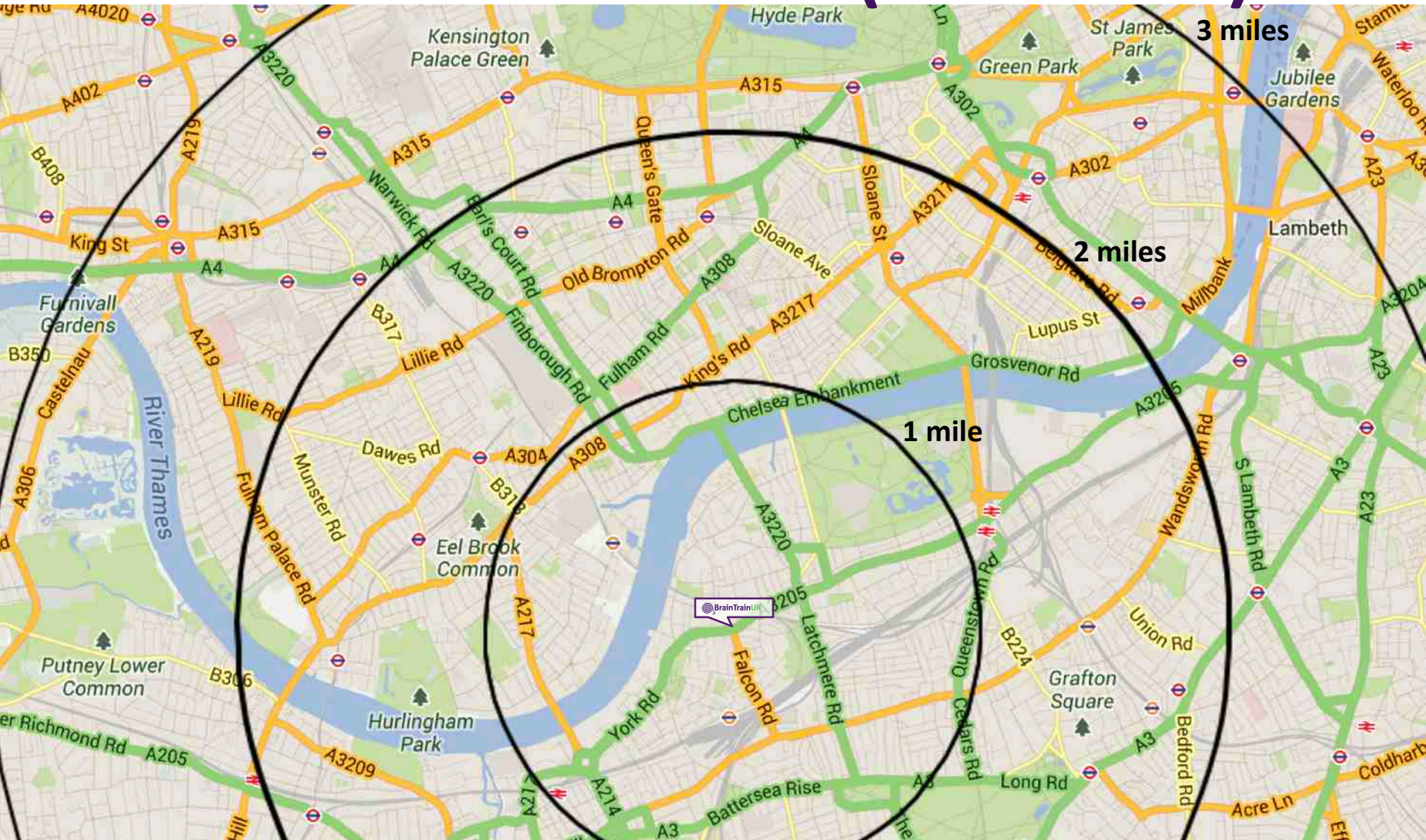
# Locations – Surrey | London | Herts



# Location - Egham

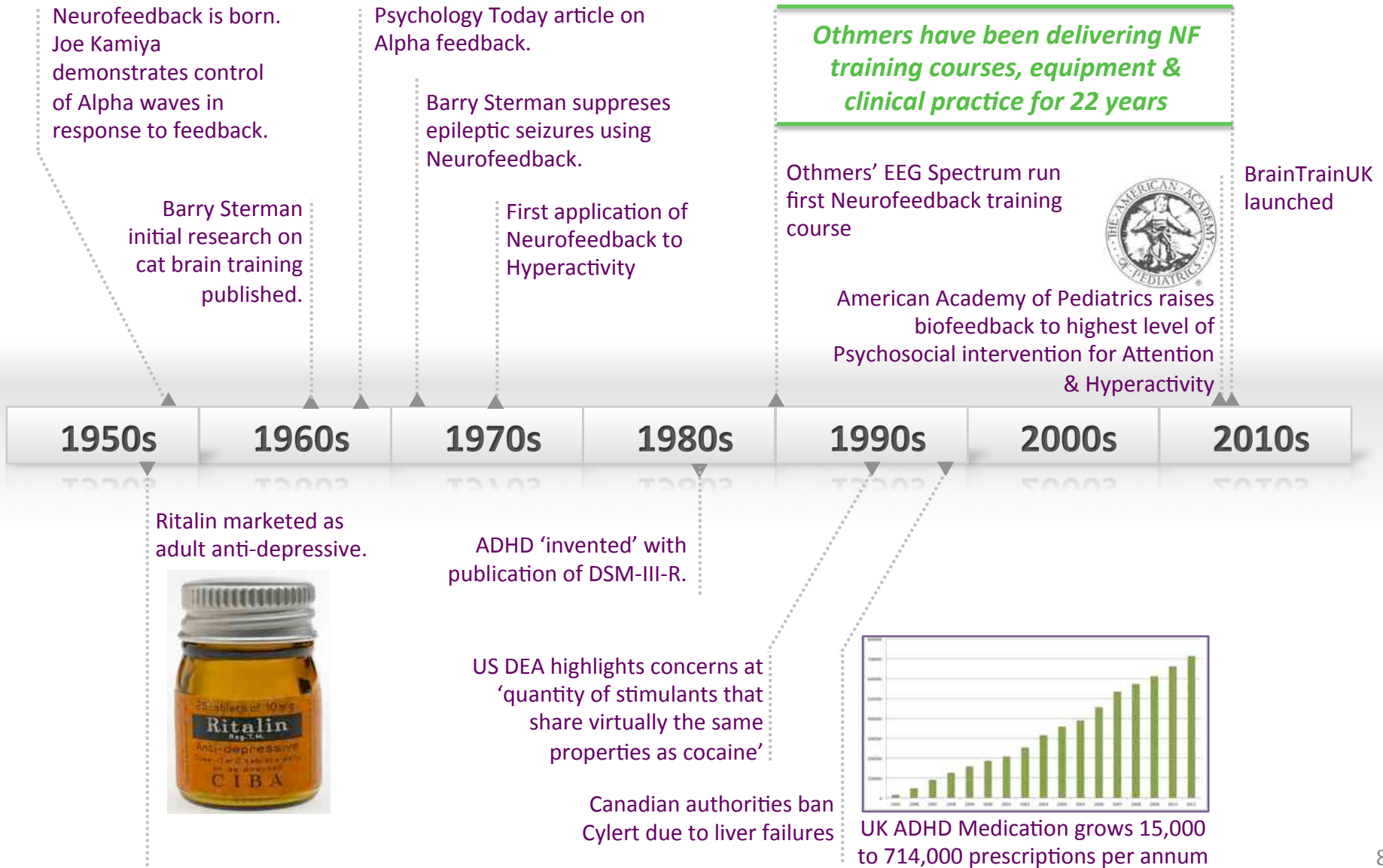


# Location – London (Battersea)



# History of Neurofeedback

## Milestones in Neurofeedback and ADHD Treatment

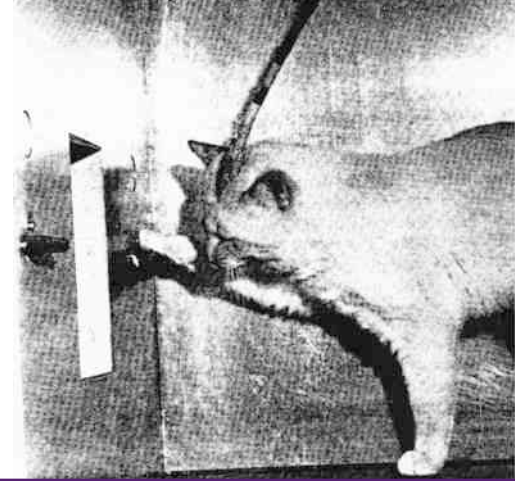




# Neurofeedback Discovery for Therapy

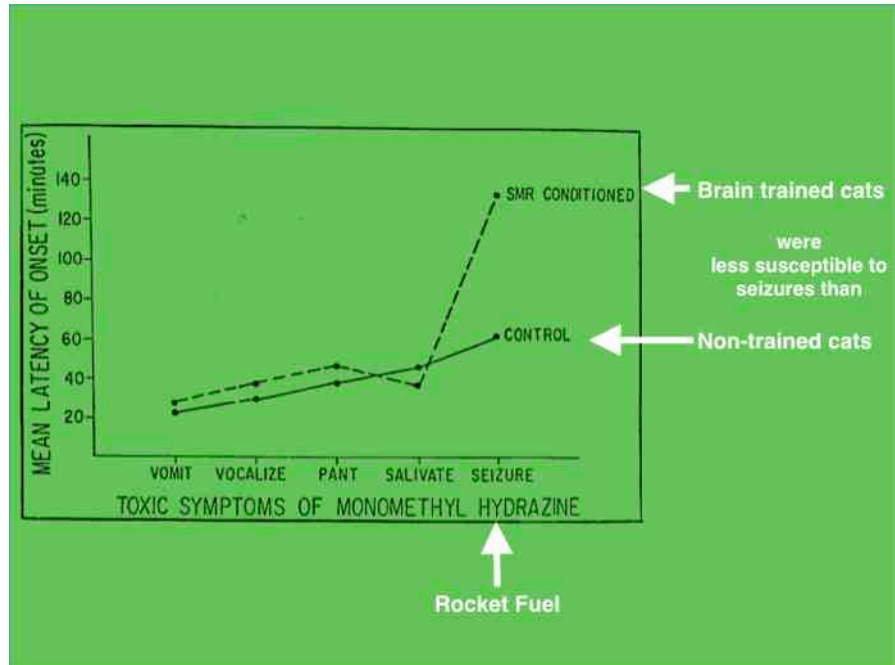


- Dr Barry Serman – sleep researcher
- Observed particular frequency in cats' brains
- Trained cats to generate these brainwaves at will – rewarded with food (chicken broth)



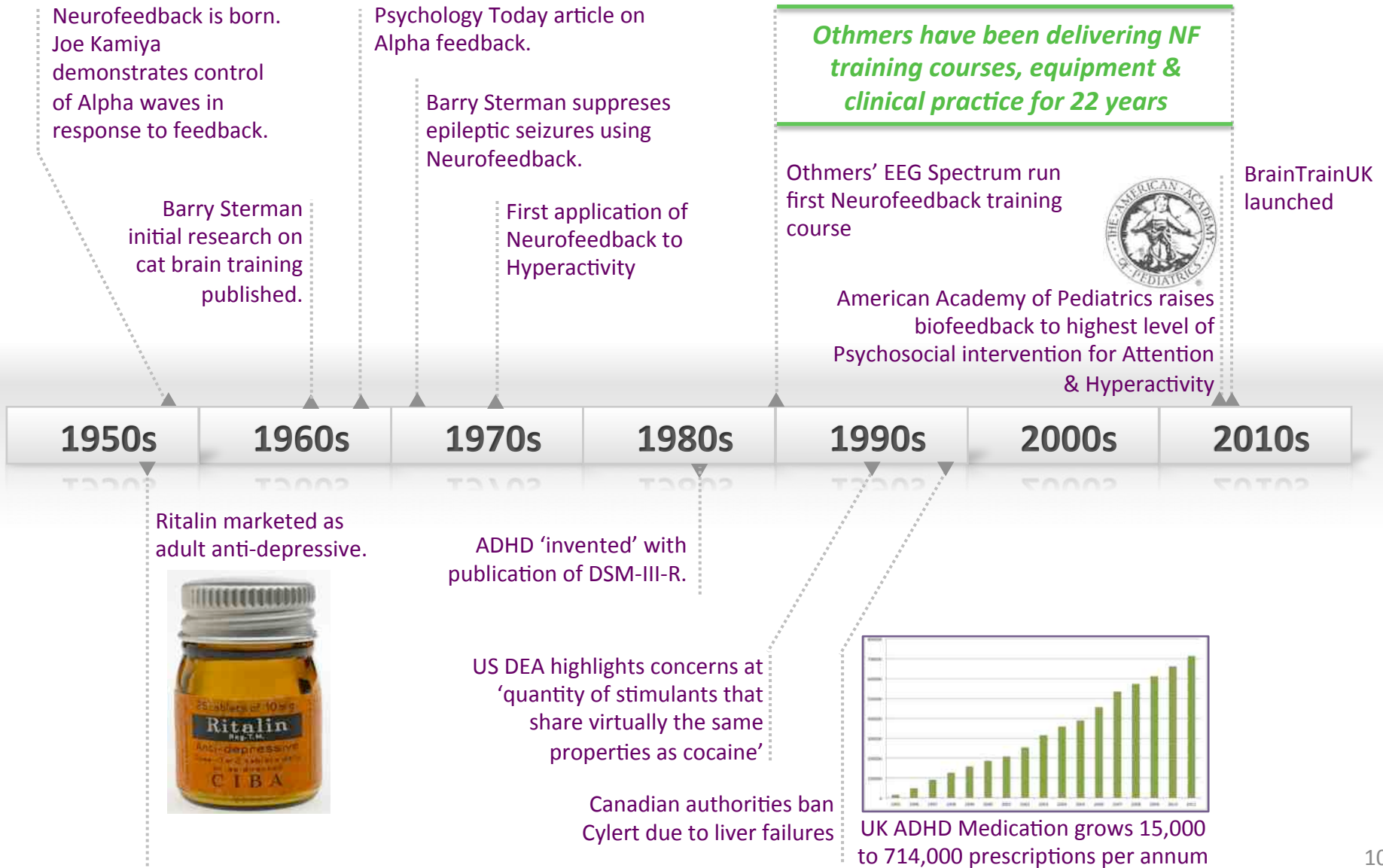
- NASA commissioned Serman to do research on toxicity of rocket fuel

- Injected cats with rocket fuel
- Unexpected results they didn't understand
- The previously brain-trained cats were much less susceptible to seizures
- Perhaps 'the ultimate double-blind design'



# History of Neurofeedback

## Milestones in Neurofeedback and ADHD Treatment



# American Academy of Pediatrics

Problem Area	Level 1- BEST SUPPORT	Level 2- GOOD SUPPORT	Level 3- MODERATE SUPPORT	Level 4- MINIMAL SUPPORT	Level 5- NO SUPPORT
<b>Anxious or Avoidant Behaviors</b>	Cognitive Behavior Therapy (CBT), CBT and Medication, CBT with Parents, Education, Exposure, Modeling	Assertiveness Training, Attention, CBT for Child and Parent, Cultural Storytelling, Family Psychoeducation, Hypnosis, Relaxation, Stress Inoculation	Contingency Management, Group Therapy	Biofeedback, CBT with Parents Only, Play Therapy, Psychodynamic Therapy, Rational Emotive Therapy	Assessment/Monitoring, Attachment Therapy, Client Centered Therapy, Eye Movement Desensitization and Reprocessing (EMDR), Peer Pairing, Psychoeducation, Relationship Counseling, Teacher Psychoeducation
<b>Attention and Hyperactivity Behaviors</b>	Behavior Therapy and Medication, Biofeedback, Parent Management Training, Self-Verbalization	Contingency Management, Education, Parent Management Training (with Problem Solving, or with Teacher Psychoeducation), Physical Exercise (with or without Relaxation), Social Skills and Medication, Working Memory Training	Biofeedback and Medication	Parent Management Training and Social Skills, Relaxation, Self-Verbalization and Contingency Management, Social Skills	Attention Training, Client Centered Therapy, CBT, CBT and Anger Control, CBT and Medication, Family Therapy, Parent Coping/Stress Management, Parent Management Training and Self-Verbalization, Problem Solving, Psychoeducation, Self-Control Training, Self-Verbalization and Medication, Skill Development
<b>Autism Spectrum Disorders</b>	Intensive Behavior Therapy, Intensive Communication Training, CBT, Assertiveness Training, CBT, Multisystemic Training, Parent Management Training and Problem Solving, Social Skills	Parent Management Training, Peer Pairing, Physical/Social/Occupational Therapy	None	Cognitive Behavior Therapy, Massage, Social Skills	Auditory Integration Training, Biofeedback, Eclectic Therapy, Hyperbaric Treatment, Modeling, Structured Listening
<b>Conduct Disorder</b>	Contingency Management, Parent Management Training, Parent Management Training and Problem Solving, Social Skills	Communication Skills, Contingency Management, Functional Family Therapy, Parent Management Training, Parent Management Training and Problem Solving, Classroom Management, Problem Solving, Rational Emotive Therapy, Relaxation, Therapeutic Foster Care, Transactional Analysis	Client Centered Therapy, Family Therapy, Moral Counseling, Peer Pairing, Self-Control Training	CBT and Teacher Training; Parent Management Training, Classroom Contingency Management, and CBT; Parent Management Training and Self-Verbalization; Physical Exercise; Stress Inoculation	Behavioral Family Therapy, Catharsis, CBT and Anger Control, CBT with Parents, Collaborative Problem Solving, Education, Exposure, Family Empowerment, Family Systems Therapy, Group Therapy (!), Imagery Training, Parent Management Training and Peer Support, Play Therapy, Psychodynamic Therapy, Self-Verbalization, Skill Development, Wraparound
<b>Depressive or Withdrawn Behaviors</b>	CBT, CBT and Medication, Client Centered Therapy, Cognitive Behavioral Therapy, Family Therapy, Problem Solving, Social Skills	Client Centered Therapy, Family Therapy, Problem Solving, Social Skills	None	Problem Solving, Self-Control Training, Self-Modeling	Life Skills, Play Therapy, Psychodynamic Therapy, Psychoeducation, Social Skills
<b>Eating Disorders</b>	None	CBT, Family Therapy, Family Systems Therapy	None	None	Client Centered Therapy, Education, Goal Setting
<b>Emotional Disorders</b>	None	CBT, Family Therapy, Family Systems Therapy	None	None	Assessment/Monitoring, Assessment/Monitoring and Medication, Behavioral Training and Medical Care, Biofeedback, Contingency Management, Dietary Care, Dietary Care and Medical Care, Hypnosis, Medical Care, Psychoeducation
<b>Manic/Depressive Behaviors</b>	None	None	None	None	Family-Focused Therapy, Psychoeducation
<b>Oppositional Defiant Disorder</b>	Reinforcement, Family Therapy	with Parents, Contingency Management, Family Systems Therapy, Functional Family Therapy, Goal Setting/Monitoring, Motivational Interviewing/Engagement (with and without CBT), Multidimensional Family Therapy, Future Brief Family Therapy	None	Goal Setting	Behavioral Family Therapy, CBT and Functional Family Therapy, Client Centered Therapy, Drug Court and Multisystemic Therapy, Education, Family Court, Group Therapy (!), Motivational Interviewing/Engagement with CBT and Family Therapy, Multisystemic Therapy, Parent Psychoeducation, Problem Solving, Project CARE (!), Psychoeducation
<b>Suicidality</b>	None	Attachment Therapy, Counselors Care, Counselors Care and Support Training, Multisystemic Therapy, Social Support Team	None	None	Accelerated Hospitalization, Counselors Care and Anger Management
<b>Traumatic Stress</b>	CBT, CBT with Parents	Exposure	None	EMDR, Play Therapy, Psychodrama	Client Centered Therapy, CBT and Medication, CBT with Parents Only, Interpersonal Therapy, Psychodynamic Therapy, Psychoeducation, Relaxation

## Strength of Evidence Definitions

### Level 1: Best Support

- I. At least 2 randomized trials demonstrating efficacy in one or more of the following ways:
  - a. Superior to pill placebo, psychological placebo, or another treatment.
  - b. Equivalent to all other groups representing at least one Level 1 or Level 2 treatment in a study with adequate statistical power (30 participants per group on average) and that showed significant pre-post change in the index group as well as the group(s) being tied. Ties of treatments that have previously qualified only through ties are ineligible.
- II. Experiments must be conducted with treatment manuals.
- III. Effects must have been demonstrated by at least 2 different investigator teams.

**Note:** Level 5 refers to treatments whose tests were non-supportive or inconclusive. The symbol (!) indicates that at least one study found negative effects on the main outcome measure. The risk of using treatments so designated should be weighed against potential benefits. This report updates and replaces the "Blue Menu" originally distributed by the Hawaii Department of Health, Child and Adolescent Mental Health Division, Evidence-Based Services Committee from 2002-2009. The recommendations in this publication do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate. Original document included as part of *Addressing Mental Health Concerns in Primary Care: A Clinician's Toolkit*. Copyright © 2011 American Academy of Pediatrics, revised October 2012. All Rights Reserved. The American Academy of Pediatrics does not review or endorse any modifications made to this document and in no event shall the AAP be liable for any such changes.

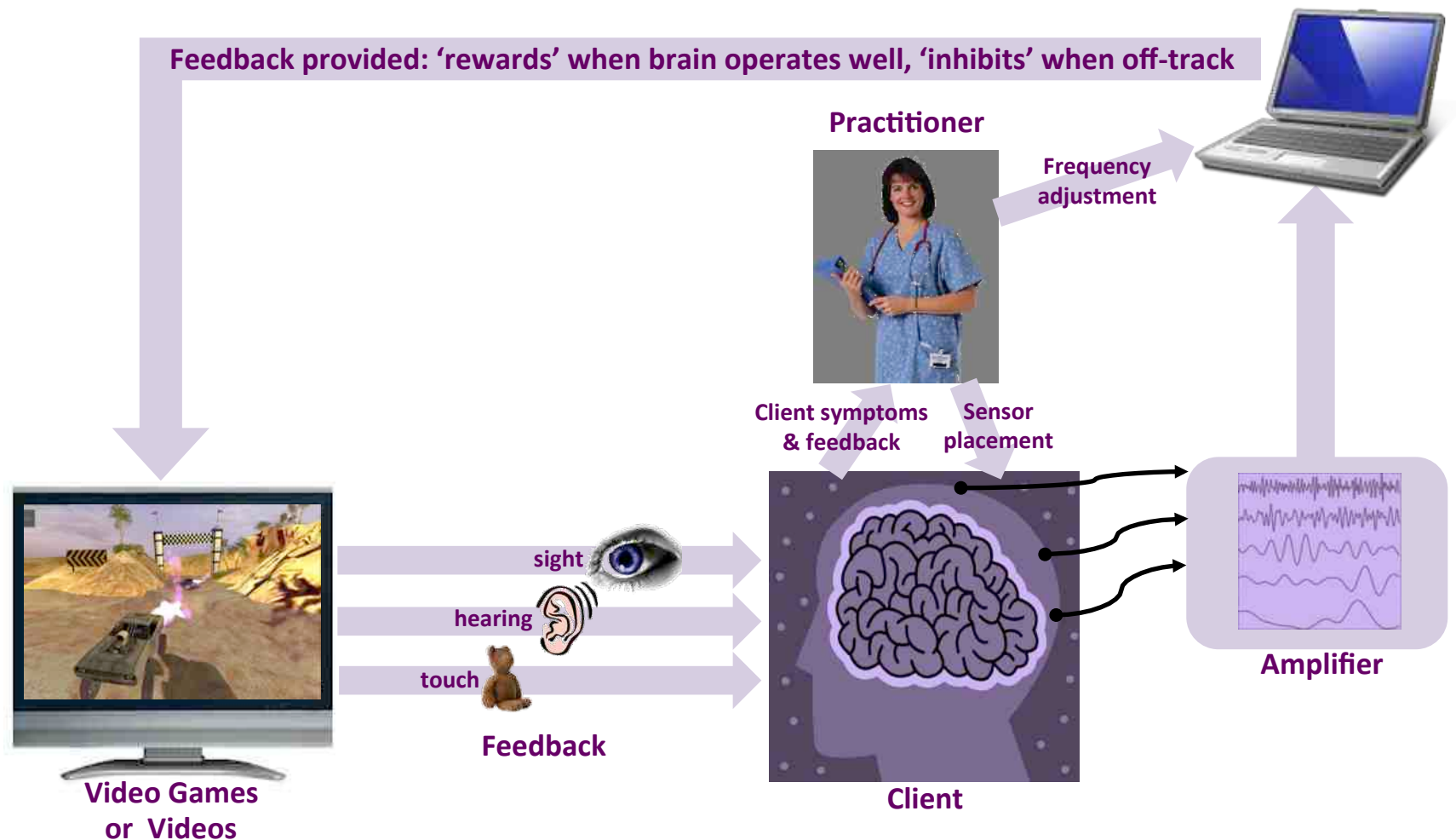


# Recent Evidence Base for NF for ADHD

Year	Journal	Sample	Control	Random	Key Results/Conclusions
2009	*Journal of Child Psychology and Psychiatry	102	✓	✓	Results indicate <b>clinical efficacy of NF</b> for children with ADHD.
2006	*Neuroscience Letters	20	✓	✓	Results suggest <b>NF has the capacity to functionally normalize brain systems mediating selective attention and response inhibition</b> in ADHD children.
2006	*Applied Psychophysiology and Biofeedback	20	✓	✓	
2009	Clinical EEG and Neuroscience	1,194	N/A	N/A	Meta study concluded <b>NF is efficacious &amp; specific</b> for ADHD.
2012	BMC Psychiatry	130	✓	✓	<b>NF is as effective as methylphenidate.</b>
2002	Applied Psychophysiology and Biofeedback	100	✓		<b>NF showed significant improvement in behavior</b> , Ritalin did not. <b>NF group showed normalisation</b> of EEG, Ritalin group did not.
2005	Child and Adolescent Psychiatric Clinics of North America	100	✓		<b>NF group still showed improvement 2 years after end of NF</b> , Ritalin effect ended on cessation of medication. <b>80% of NF group reduced Ritalin by &gt; 50%</b> ; 85% of Ritalin group increased dose, 0 reduced.
2007	Applied Psychophysiology and Biofeedback	38	✓	✓	2 different NF protocols showed improvement in all 4 measures.
2008	International Journal of Bioelectromagnetism	38	✓	✓	<b>Improvements still present from NF 2 years after original trial.</b>

\* Studies that directly led American Academy of Pediatrics to endorse NF as Level 1 evidence-based psychosocial intervention October 2012

# What is Neurofeedback ?



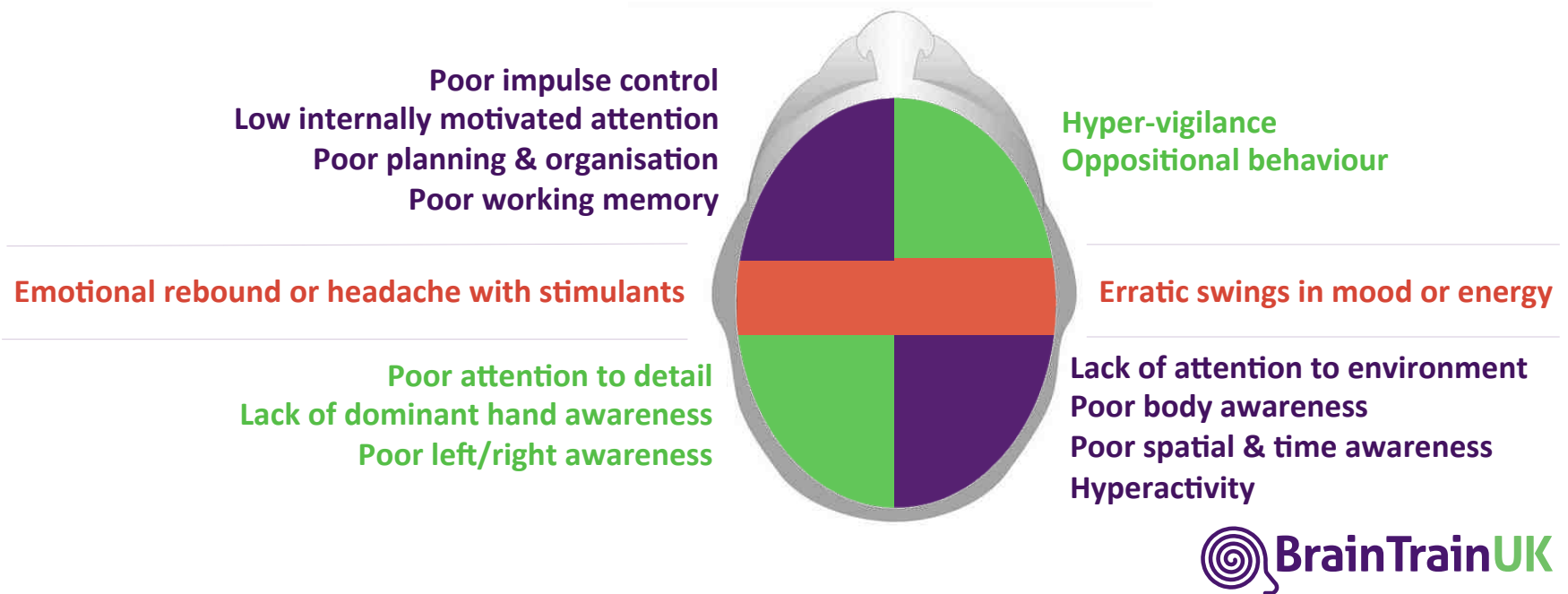
*Neurofeedback trains the brain's ability to self-regulate by feeding back information on selected EEG rhythms related to regulation*

# What is Neurofeedback ?

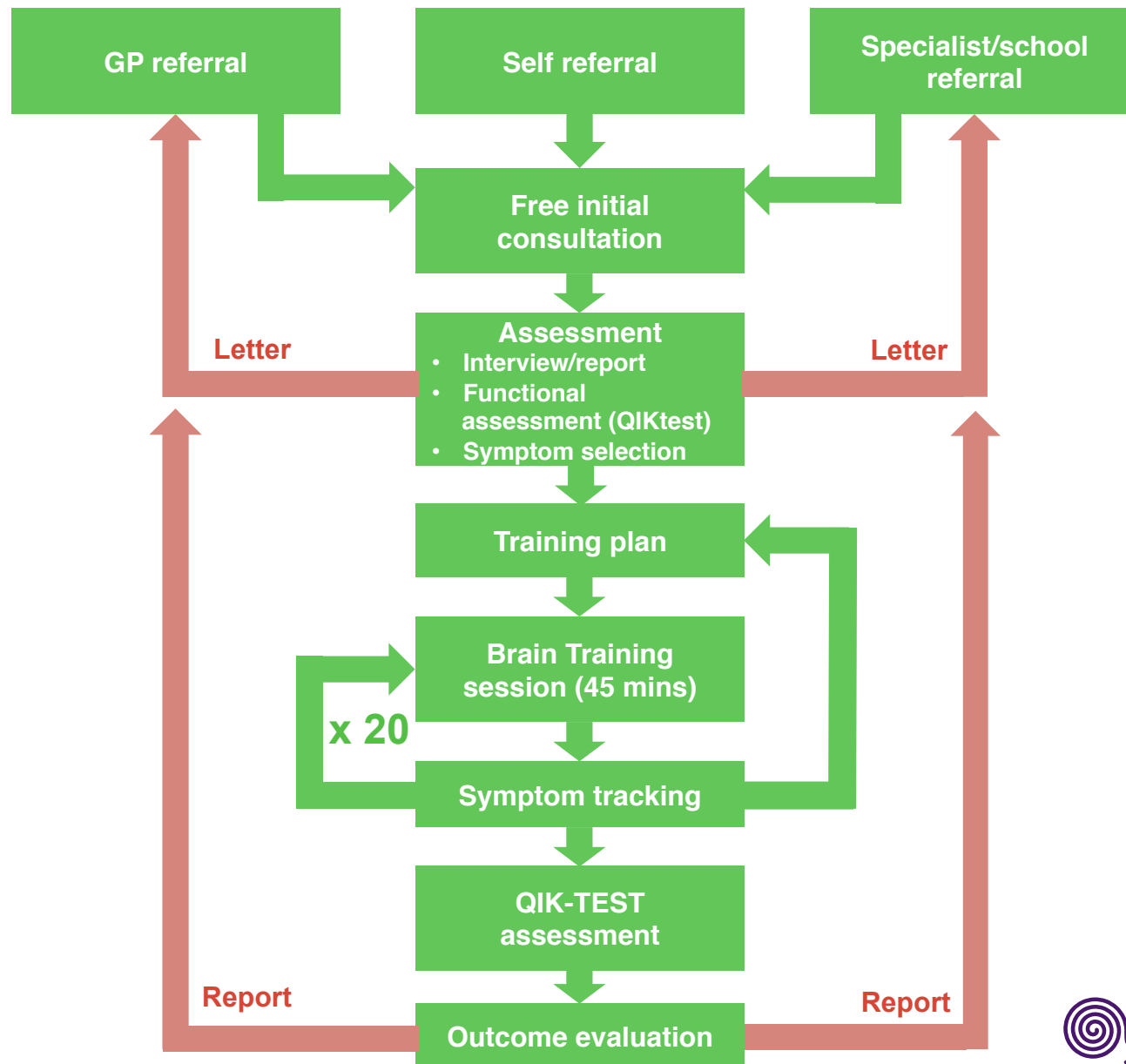


# Neurofeedback Training

- NF is a tool to improve central nervous system regulation
- Neurofeedback trains the brain's ability to self-regulate by feeding back information on selected EEG rhythms related to regulation
- Good regulation = flexible & stable management of brain states in response to circumstances
- Dis-Regulation symptoms guide training positions, example:



# Our NF Training Approach





# Questions ?

# Backup Slides

# Recent Evidence Base for NF

## The Journal of Child Psychology and Psychiatry - 2009

Gevensleben, H., Holl, B., Albrecht, B., Vogel, C., Schlamp, D., et al. (2009). Is neurofeedback an efficacious treatment for ADHD?: A randomized controlled clinical trial. *Journal of Child Psychology and Psychiatry*, 50, 780–789

Sample	102 children aged 8-12 with ADHD diagnosis.
Control	Attention control software training game.
Outcome measurement	Pre & post training assessments using parent & teacher behaviour rating scales.
Results	Improvements with NF group > control group.
Conclusions	“Neurofeedback effects are substantial and of practical importance”. “indicates clinical efficacy of neurofeedback in children with ADHD”.

# Recent Evidence Base for NF

## Neuroscience Letters - 2006

Levesque, J., Beauregard, M., & Mensour, B. (2006). Effect of neurofeedback training on the neural substrates of selective attention in children with attention deficit/hyperactivity disorder: A functional magnetic resonance imaging study. *Neuroscience Letters*, 394, 216–221.

Sample	20 children with ADHD diagnosis.
Control	Control group had no NF training.
Outcome measurement	Pre & post training assessments of Counting Stroop test whilst brain activity was monitored using Functional MRI scan.
Results	Before training both groups showed abnormal brain function during test - no activity in anterior cingulate cortex (ACC). After training NF group showed significantly greater test score & significant activity in ACC.
Conclusions	Results “suggest that in ADHD children, neurofeedback therapy has the capacity to normalize the functioning of the ACC, the key neural substrate of selective attention”.

# Recent Evidence Base for NF

## Applied Psychophysiology and Biofeedback - 2006

Beauregard, M., & Levesque, J. (2006). Functional magnetic resonance imaging investigation of the effects of neurofeedback training on neural bases of selective attention and response inhibition in children with attention-deficit/hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 31, 3–20

Sample	20 children with ADHD diagnosis.
Control	Control group had no NF training.
Outcome measurement	Pre & post training assessments of reaction and impulsivity test whilst brain activity was monitored using Functional MRI scan.
Results	Before training neither group showed activity in areas of brain associated with response inhibition. After training NF group showed significant test result improvements and fMRI showed significant activity in areas of the brain monitored.
Conclusions	Results “suggest that neurofeedback therapy has the capacity to functionally normalize the brain systems mediating selective attention and response inhibition in ADHD children”.

# Recent Evidence Base for NF

## Clinical EEG and Neuroscience - 2009

Arns, M., de Ridder, S., Strehl, U., Breteler, M., & Coenen, A. (2009). Efficacy of neurofeedback treatment in ADHD: the effects on inattention, impulsivity and hyperactivity: a meta-analysis. *Clinical EEG and neuroscience*, 40(3), 180-189.

Sample	Meta study of 15 previous studies of application of NF to ADHD with aggregated participants of 1,194.
Control	N/A.
Outcome measurement	The studies were analysed to assess to what extent it can be concluded that neurofeedback is an effective treatment for ADHD symptoms.
Results	The authors concluded “the clinical effects of neurofeedback in the treatment of ADHD can be regarded as clinically meaningful.”
Conclusions	“We conclude that neurofeedback treatment for ADHD can be considered ‘Efficacious and Specific’ (level 5) with a high ES for inattention and impulsivity and a medium ES for hyperactivity.”

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## Clinical EEG and Neuroscience - 2009

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# Recent Evidence Base for NF

## BMC Psychiatry – 2012

Duric NS, Assmus J, Gundersen DI, Elegen IB. (2012). Neurofeedback for the treatment of children and adolescents with ADHD: A randomized and controlled clinical trial using parental reports. *BMC Psychiatry*, 12:107

Sample	130 ADHD diagnosed children aged 6-18
Control	3 groups: 1.NF; 2. Methylphenidate; 3. Methylphenidate + NF.
Outcome measurement	Parental reports.
Results	NF as effective as medication.
Conclusions	“NF produced a significant improvement in the core symptoms of ADHD, which was equivalent to the effects produced by MPH, based on parental reports. This supports the use of NF as an alternative therapy for children and adolescents with ADHD.”



# Recent Evidence Base for NF

## Applied Psychophysiology and Biofeedback – 2002

Monastra, V.J., Monastra, D.M. & George, S. (2002) *The effects of stimulant therapy, EEG biofeedback, and parenting style on the primary symptoms of attention-deficit/hyperactivity disorder*. Applied Psychophysiology and Biofeedback, Vol 27, No 4, p231-249

Sample	100 children aged 6-19 with ADHD diagnosis
Control	Group 1. Ritalin + academic support + parental coaching; 2. As 1 + NF.
Outcome measurement	Parent & teacher rating scales. EEG measurement in areas associated with attention. Attention & impulsiveness test.
Results	After 1 year, control group (no NF) improvement not robust. NF group showed significant improvement. Whilst Ritalin still being taken, only NF group showed improvement in EEG activity to 'normal' levels.
Conclusions	"stimulant therapy would appear to constitute a type of prophylactic intervention, reducing or preventing the expression of symptoms without causing an enduring change in the underlying neuropathy of ADHD".

# Recent Evidence Base for NF (ASD)

## Research in Autism Spectrum Disorders - 2010

Kouijzer, M. E., van Schie, H. T., de Moor, J. M., Gerrits, B. J., & Buitelaar, J. K. (2010). Neurofeedback treatment in autism. Preliminary findings in behavioral, cognitive, and neurophysiological functioning. *Research in Autism Spectrum Disorders*, 4(3), 386-399.

Sample	12 children aged 8-12 with autistic disorder and IQ > 80.
Control	No NF.
Outcome measurement	
Results	
Conclusions	

# Recent Evidence Base for NF for ASD

## Journal of Neurotherapy – 2007

Coben, R., & Padolsky, I. (2007). Assessment-guided neurofeedback for autistic spectrum disorder. *Journal of Neurotherapy*, 11(1), 5-23.

Sample	
Control	
Outcome measurement	
Results	
Conclusions	

# Recent Evidence Base for NF

## Child and Adolescent Psychiatric Clinics of North America – 2005

Monastra VJ (2005). Electroencephalographic biofeedback (neurotherapy) as a treatment for attention deficit hyperactivity disorder: rationale and empirical foundation.

*Child Adolesc Psychiatric Clin N Am*, 14, 55– 82

Sample	100 children aged 6-19 with ADHD diagnosis
Control	Group 1.Ritalin + academic support + parental coaching; 2. As 1 + NF.
Outcome measurement	Parent & teacher rating scales. EEG measurement in areas associated with attention. Attention & impulsiveness test.
Results	Follow-on study to Monastra et al (2002). 2 years after NF ended, NF group continued to demonstrate improvements on a 3 measures – biological, behavioural, neuropsychological.
Conclusions	80% of NF group had decreased their Ritalin dose by more than 50%. 85% of the control group had increased their Ritalin dose, none had reduced it.

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# Our NF Training Approach

- Self referral or referral by GP/specialist/school
- Initial (free) consultation
- Assessment: Interview/report, neuropsychological testing (QIKtest), symptom tracking
- Report to GP, copied to referrer (with client consent)
- Training – initial 20 sessions, 45 mins per session (30 mins NF), min 2x weekly
- Evaluation – QIKtest, symptom tracking, client reporting
- 20 sessions cost £1500
- Money-back guarantee offered for ADHD symptom improvement training if no improvement