# Virtual Iraq: Design, Development & Initial Data from a VR PTSD Exposure Therapy Application

Skip Rizzo, Barbara Rothbaum, JoAnn Difede, Karen Perlman, Ken Graap, Greg Reger, Cpt. Rob McLay, Scott Johnston, Jeff Pyne, Robert Deal, Jarrell Pair, Tom Parsons, Col. Mike Roy, Col. Greg Gahm & Russell Shilling

*USC-Institute for Creative Technologies, Emory University, Weill Medical College at Cornell, NMCSD, Virtually Better, Inc., WRAMC, MAMC-Ft. Lewis*



Virtual Iraq
for PTSD Treatment
FUNDED BY
DEPARTMENT OF THE NAVY
ONR
Science & Technology


VR Classroom for
ADHD Assessment


VR/Games to Motivate Motor Rehabilitation
Cellular Computational Behavioral VR/Haptics Clinical
ISNSR
Interdisciplinary Study of
Neuroplasticity and Stroke
Rehabilitation
Functional Recovery


ChildrensHospitalLosAngeles
International Leader in Pediatrics
VR Games Pain Distraction Project (Lange, Rizzo & Gold)


FULL SPECTRUM
VR EXPOSURE THERAPY
FOR OIF/OEF PTSD
FUNDED BY
RDECOM
U.S. Army Research, Development and Engineering Command
TATRC
Cutting Edge Medical Technology For Soldier Healthcare
DEPARTMENT OF THE NAVY
USN
ONR
Science & Technology

# Post Traumatic Stress Disorder

Post Traumatic Stress Disorder (DSM-4-TR) is caused by exposure to traumatic events that are *outside the range of usual human experiences* such as military combat, violent personal assault, being kidnapped or taken hostage, terrorist attack, torture, incarceration as a prisoner of war, natural or man-made disasters, automobile accidents, or being diagnosed with a life-threatening illness.

The disorder also appears to be more severe and longer lasting when the event is caused by human means and design (bombings, shootings, combat, etc.).

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JULY 1, 2004 VOL. 351 NO. 1

# Combat Duty in Iraq and Afghanistan, Mental Health Problems, and Barriers to Care

Charles W. Hoge, M.D., Carl A. Castro, Ph.D., Stephen C. Messer, Ph.D., Dennis McGurk, Ph.D., Dave I. Cotting, Ph.D., and Robert L. Koffman, M.D., M.P.H.

*"…The percentage of study subjects whose responses met the screening criteria for major depression, generalized anxiety, or PTSD was significantly higher after duty in Iraq (15.6 to 17.1 percent) than after duty in Afghanistan (11.2 percent) or before deployment to Iraq (9.3 percent)" (Hoge et al., 2004)*

# News Release

**FOR RELEASE**
Thursday
April 17, 2008

**OFFICE OF MEDIA RELATIONS**
703-413-1100 x5117
and 310-451-6913
media@rand.org

## One In Five Iraq and Afghanistan Veterans Suffer from PTSD or Major Depression

Nearly 20 percent of military service members who have returned from Iraq and Afghanistan — 300,000 in all — report symptoms of post traumatic stress disorder or major depression, yet only slightly more than half have sought treatment, according to a new RAND Corporation study.

In addition, researchers found about 19 percent of returning service members report that they experienced a possible traumatic brain injury while deployed, with 7 percent reporting both a probable brain injury and current PTSD or major depression.

Many service members said they do not seek treatment for psychological illnesses because they fear it will harm their careers. But even among those who do seek help for PTSD or major depression, only about half receive treatment that researchers consider "minimally adequate" for their illnesses.

# Post Traumatic Stress Disorder

## *General symptoms*

- Intrusive Recollections
- Avoidance
- Emotional Numbing
- Hyper-arousal

USA TODAY Home News Travel Money Sports Life Tech W

News » Health & Behavior ▪ Medical Resources ▪ Health Information ▪ Your Health: Kim Painter

# More evidence sought on PTSD treatments

NEWS

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

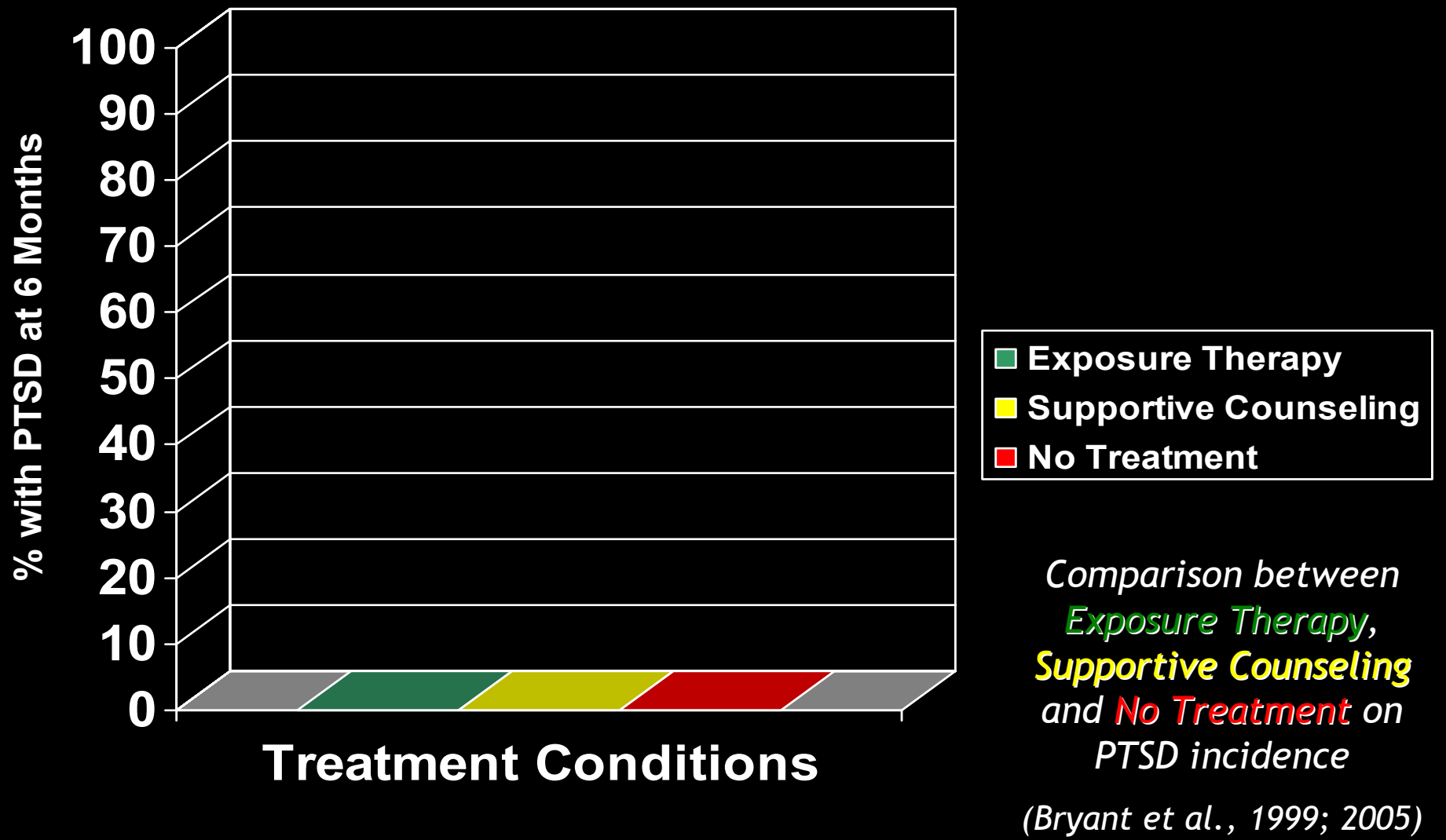
NATIONAL ACADEMY OF SCIENCES • NATIONAL ACADEMY OF ENGINEERING • INSTITUTE OF MEDICINE • NATIONAL RESEARCH COUNCIL

The committee reviewed 53 studies of pharmaceuticals and 37 studies of psychotherapies used in PTSD treatment and concluded that because of shortcomings in many of the studies, there is not enough reliable evidence to draw conclusions about the effectiveness of most treatments. *There are sufficient data to conclude that exposure therapies* -- such as exposing individuals to a real or surrogate threat in a safe environment to help them overcome their fears -- *are effective in treating people with PTSD.*

# Exposure Therapy Principles

- Exposure to feared stimulus repeatedly and for prolonged period leads to *habituation and extinction*
- Based on *learning/conditioning principles*
- Reliable findings with animals and simple phobic disorders
- One of the "Evidence-Based" PTSD approaches endorsed by DOD/VA/NAS and ISTSS treatment guidelines
- *Prolonged Therapeutic* Exposure

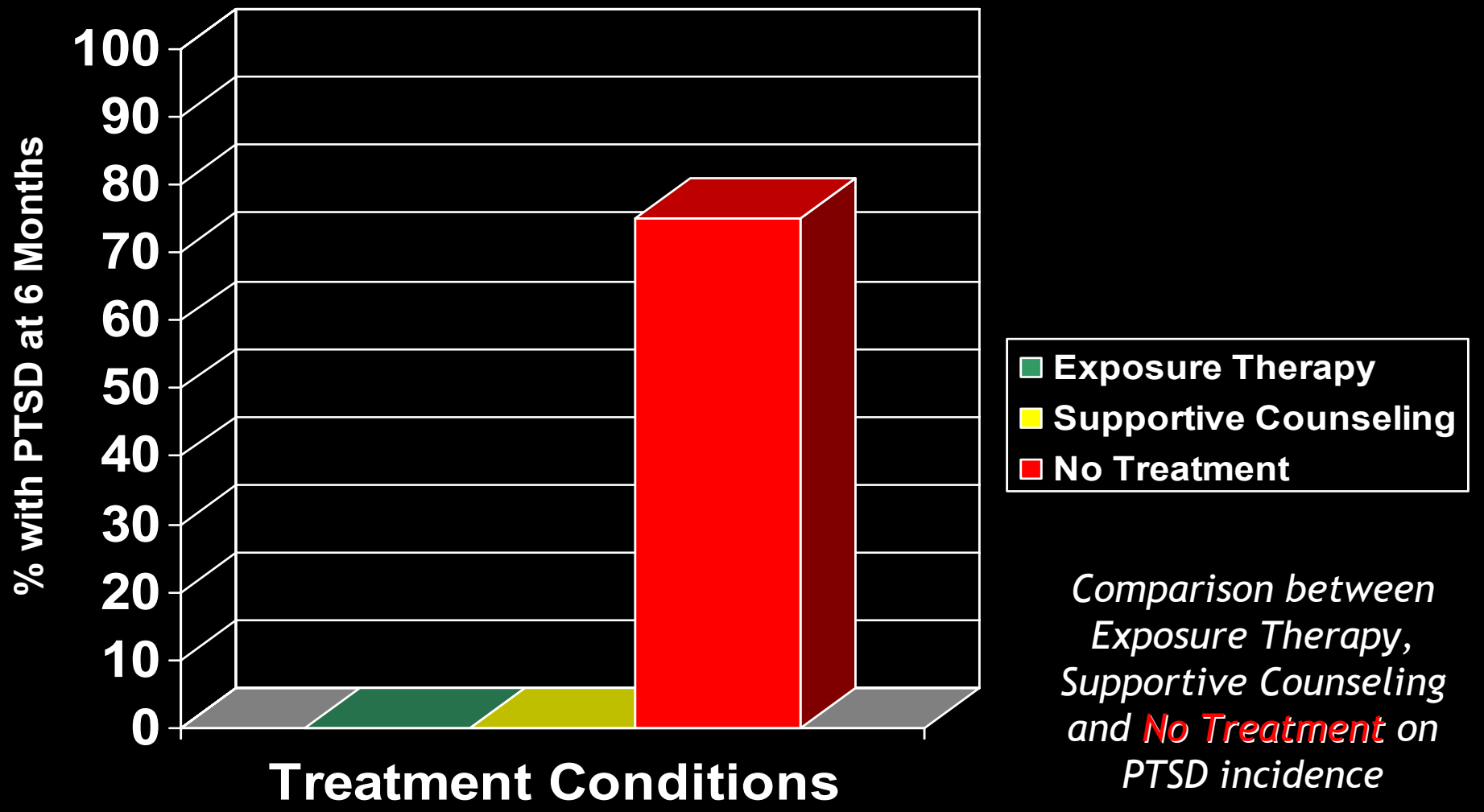
# Of those diagnosed with Posttraumatic Stress Reaction at 30 Days Post




*Comparison between Exposure Therapy, Supportive Counseling and No Treatment on PTSD incidence*

*(Bryant et al., 1999; 2005)*

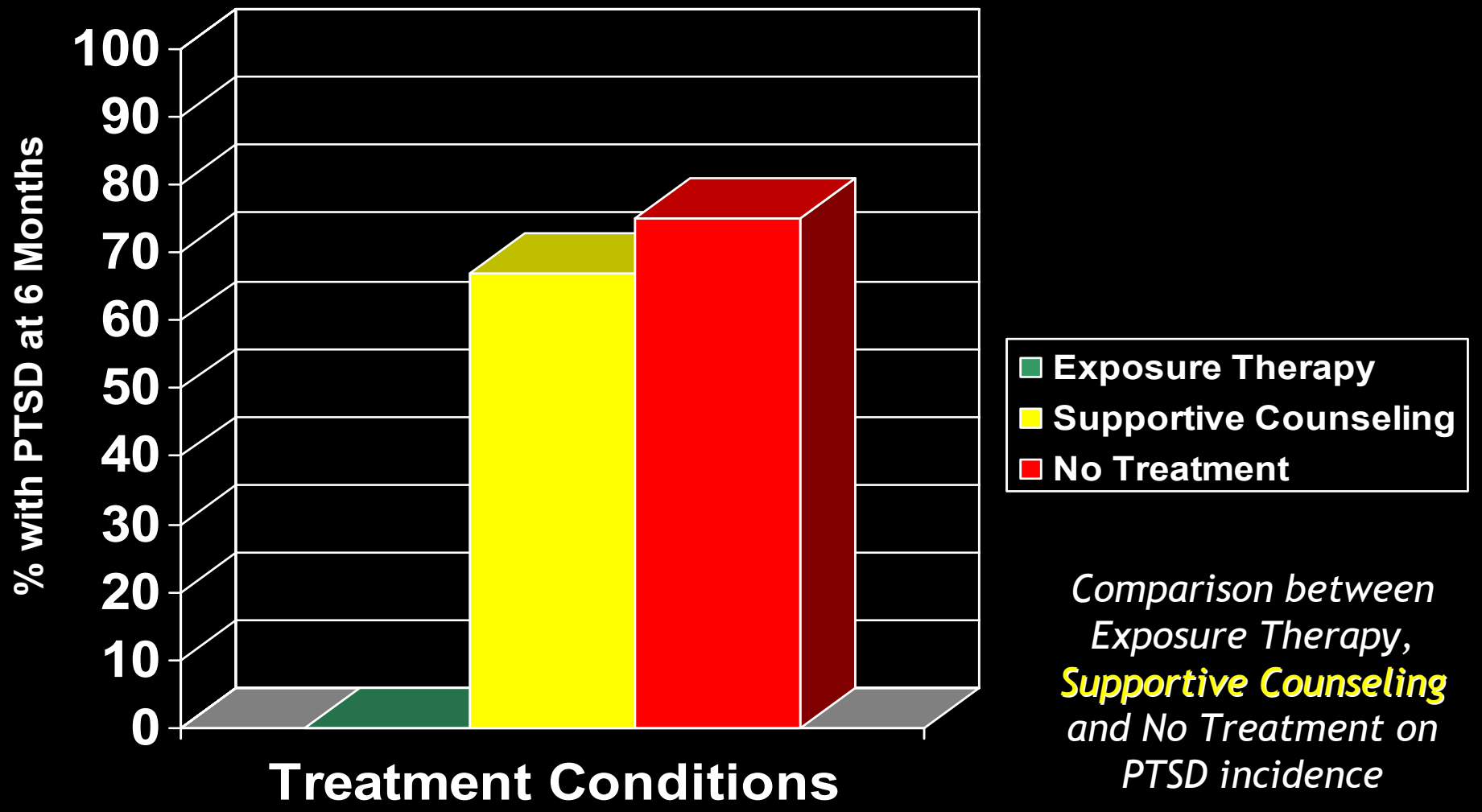
# Of those diagnosed with Posttraumatic Stress Reaction at 30 Days Post




*Comparison between Exposure Therapy, Supportive Counseling and No Treatment on PTSD incidence*

*(Bryant et al., 1999; 2005)*

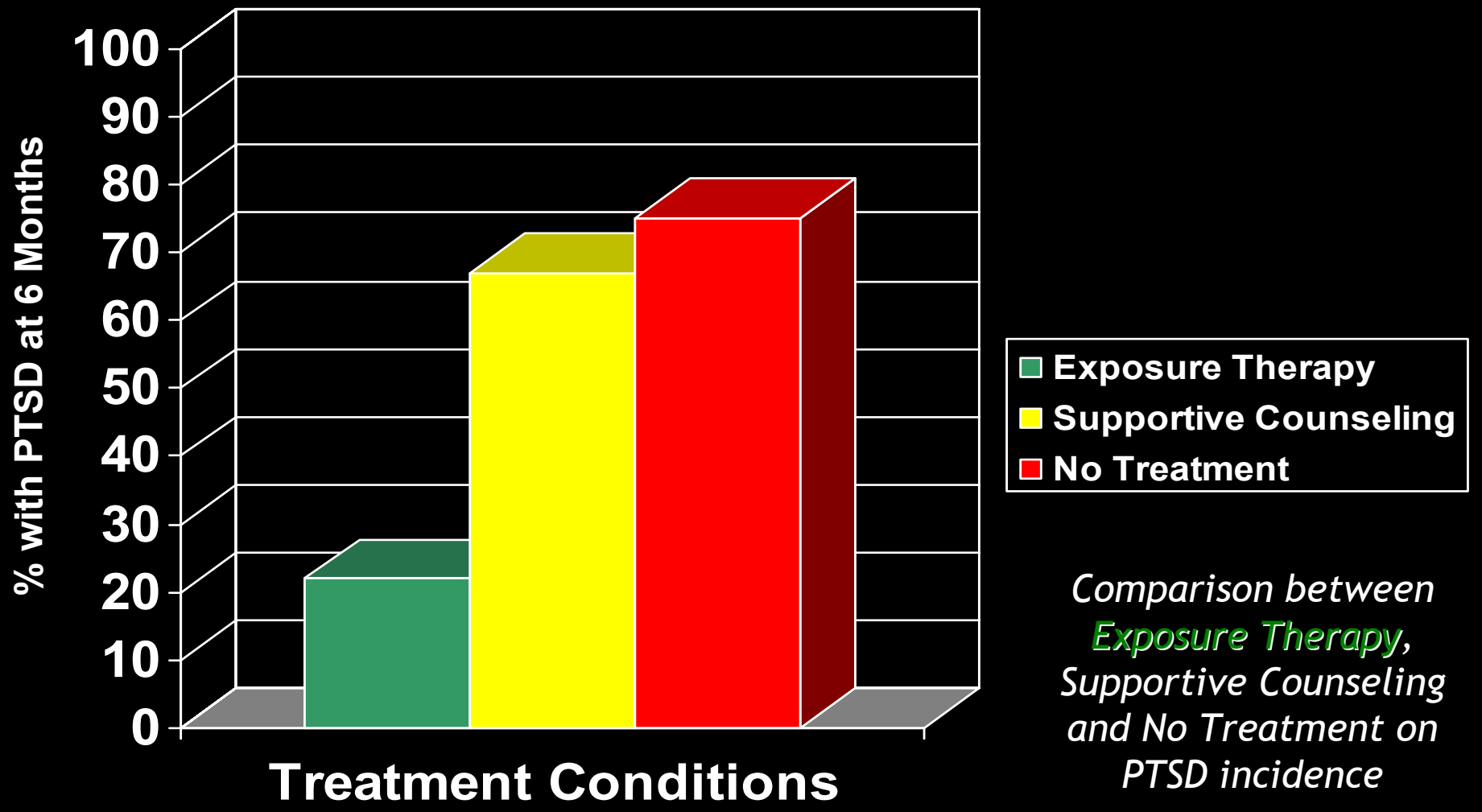
# Of those diagnosed with Posttraumatic Stress Reaction at 30 Days Post




*Comparison between Exposure Therapy, **Supportive Counseling** and No Treatment on PTSD incidence*

*(Bryant et al., 1999; 2005)*

# Of those diagnosed with Posttraumatic Stress Reaction at 30 Days Post




*Comparison between Exposure Therapy, Supportive Counseling and No Treatment on PTSD incidence*

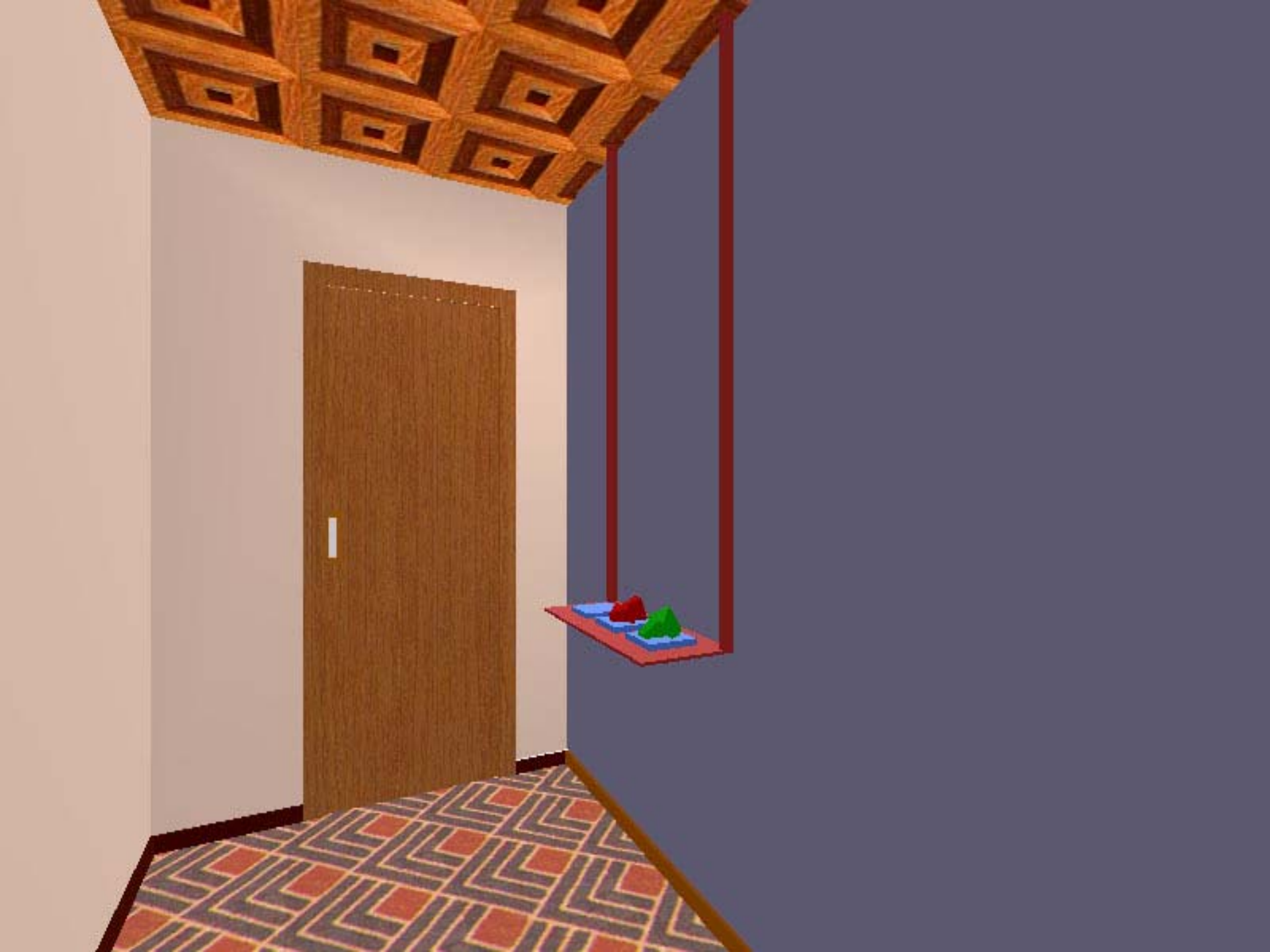
*(Bryant et al., 1999; 2005)*

# Post Traumatic Stress Disorder –
## *Problems with Imaginal Exposure*

Many patients are unwilling or unable to effectively visualize the traumatic event. In fact, avoidance of reminders of the trauma is inherent in PTSD, and is one of the defining symptoms of the disorder. Research on this aspect of PTSD treatment suggests that the inability to emotionally engage (*in imagination*) is a predictor for negative treatment outcomes (Jaycox, Foa, & Morral, 1998).

*"…some patients refuse to engage in the treatment, and others, though they express willingness, are unable to engage their emotions or senses."* (Difede & Hoffman, 2002).


VR Claustrophobia Application
(Botella et al., 1997)



# VR Anxiety Disorders Meta-Analysis

ELSEVIER

Journal of Anxiety Disorders 22 (2008) 561–569

Journal of Anxiety Disorders

Review

## Virtual reality exposure therapy for anxiety disorders: A meta-analysis

Mark B. Powers *, Paul M.G. Emmelkamp

*University of Amsterdam, The Netherlands*

Received 1 March 2007; received in revised form 11 April 2007; accepted 20 April 2007

**Abstract**

There is now a substantial literature investigating virtual reality exposure therapy (VRET) as a viable treatment option for anxiety disorders. In this meta-analysis we provide effect size estimates for virtual reality treatment in comparison to in vivo exposure and control conditions (waitlist, attention control, etc.). A comprehensive search of the literature identified 13 studies ($n = 397$) that were included in the final analyses. Consistent with prediction the primary random effects analysis showed a large mean effect size for VRET compared to control conditions, Cohen's $d = 1.11$ (S.E. = 0.15, 95% CI: 0.82–1.39). This finding was consistent across secondary outcome categories as well (domain-specific, general subjective distress, cognition, behavior, and psychophysiology). Also as expected in vivo treatment was not significantly more effective than VRET. In fact, there was a small effect size favoring VRET over in vivo conditions, Cohen's $d = 0.35$ (S.E. = 0.15, 95% CI: 0.05–0.65). There was a trend for a dose–response relationship with more VRET sessions showing larger effects ($p = 0.06$). Outcome was not related to publication year or sample size. Implications are discussed.



*Keywords:* Virtual reality; Exposure therapy; Anxiety disorders; Meta-analysis

**Journal of Anxiety Disorders**

ELSEVIER

Available online at www.sciencedirect.com

ScienceDirect

Journal of Behavior Therapy and Experimental Psychiatry ▮ (▮▮▮▮) ▮▮▮–▮▮▮

JOURNAL OF behavior therapy and experimental psychiatry

www.elsevier.com/locate/jbtep

## Affective outcomes of virtual reality exposure therapy for anxiety and specific phobias: A meta-analysis

Thomas D. Parsons*, Albert A. Rizzo

*Institute for Creative Technologies, University of Southern California, 13274 Fiji Way, Office 301, Marina del Rey, CA 90292-4019, USA*

Received 24 October 2006; received in revised form 6 July 2007; accepted 18 July 2007

**Abstract**

Virtual reality exposure therapy (VRET) is an increasingly common treatment for anxiety and specific phobias. Lacking is a quantitative meta-analysis that enhances understanding of the variability and clinical significance of anxiety reduction outcomes after VRET. Searches of electronic databases yielded 52 studies, and of these, 21 studies (300 subjects) met inclusion criteria. Although meta-analysis revealed large declines in anxiety symptoms following VRET, moderator analyses were limited due to inconsistent reporting in the VRET literature. This highlights the need for future research studies that report uniform and detailed information regarding presence, immersion, anxiety and/or phobia duration, and demographics.



*Keywords:* Virtual reality exposure therapy; Anxiety; Meta-analysis; Phobia; Affective neuroscience

**Journal of Behavior Therapy and Experimental Psychiatry**

# VR Anxiety Disorders Meta-Analysis

Table 2: The Average Random Effect Sizes, including the Variance and Confidence Limits for the Mean Effect Sizes, for the Affective Domains and the Anxiety Total.

| Domain | Average Random Effect Size | Effect Size Variance | 95% CI Lower | Upper | r | % |
|---|---|---|---|---|---|---|
| PTSD | 0.94 | 0.01 | 0.78 | 1.10 | 0.42 | 0.18 |
| Social phobia | 0.96 | 0.10 | 0.34 | 1.59 | 0.43 | 0.19 |
| Arachnophobia | 0.92 | 0.12 | 0.25 | 1.59 | 0.42 | 0.18 |
| Acrophobia | 0.93 | 0.06 | 0.44 | 1.43 | 0.42 | 0.18 |
| Panic disorder with agoraphobia | 1.79 | 0.02 | 1.52 | 2.06 | 0.67 | 0.44 |
| Aerophobia | 1.75 | 0.07 | 1.25 | 2.26 | 0.66 | 0.43 |
| Anxiety Total | 0.96 | 0.02 | 0.68 | 1.25 | 0.43 | 0.19 |

Note: All reported random effect sizes reflect large effects for VRET on decrease of negative affective symptoms. PTSD = Post-Traumatic Stress Disorder. % = percent of variance accounted for by VRET. The average weighted effect sizes were calculated for each of the six affective domains and an overall affective effect size (Anxiety Total). This involved combining the standardized effect sizes within each affective domain (within and across domains for Anxiety total) into a composite-mean weighted effect size, and examining each domain's significance. Total N= 266.

In: Parsons & Rizzo (2008) *Journal of Behavior Therapy & Experimental Psychiatry*

# VR PTSD Examples

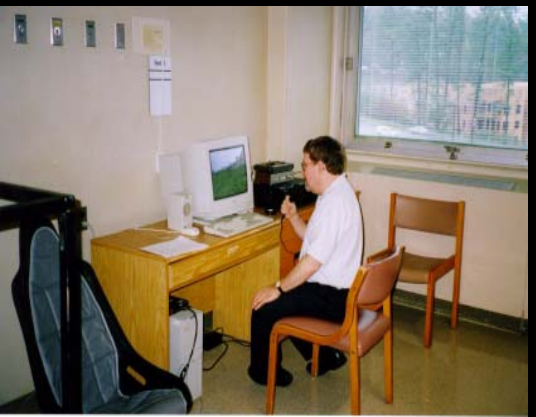
- Virtual Vietnam – *Emory University*
- World Trade Center – *Weill Cornell Medical Center/U of Wash*
- Terrorist Bus Bombing - *U. of Haifa/U of Wash*
- Motor Vehicle Accidents – *Univ. of Buffalo*
- Emma's World - *Universitat de València (Spain)*
- Virtual Angola – *U. of Lusófona de Humanidades e Tecnologias, Lisbon*
- Virtual Iraq – *USC Institute for Creative Technologies*



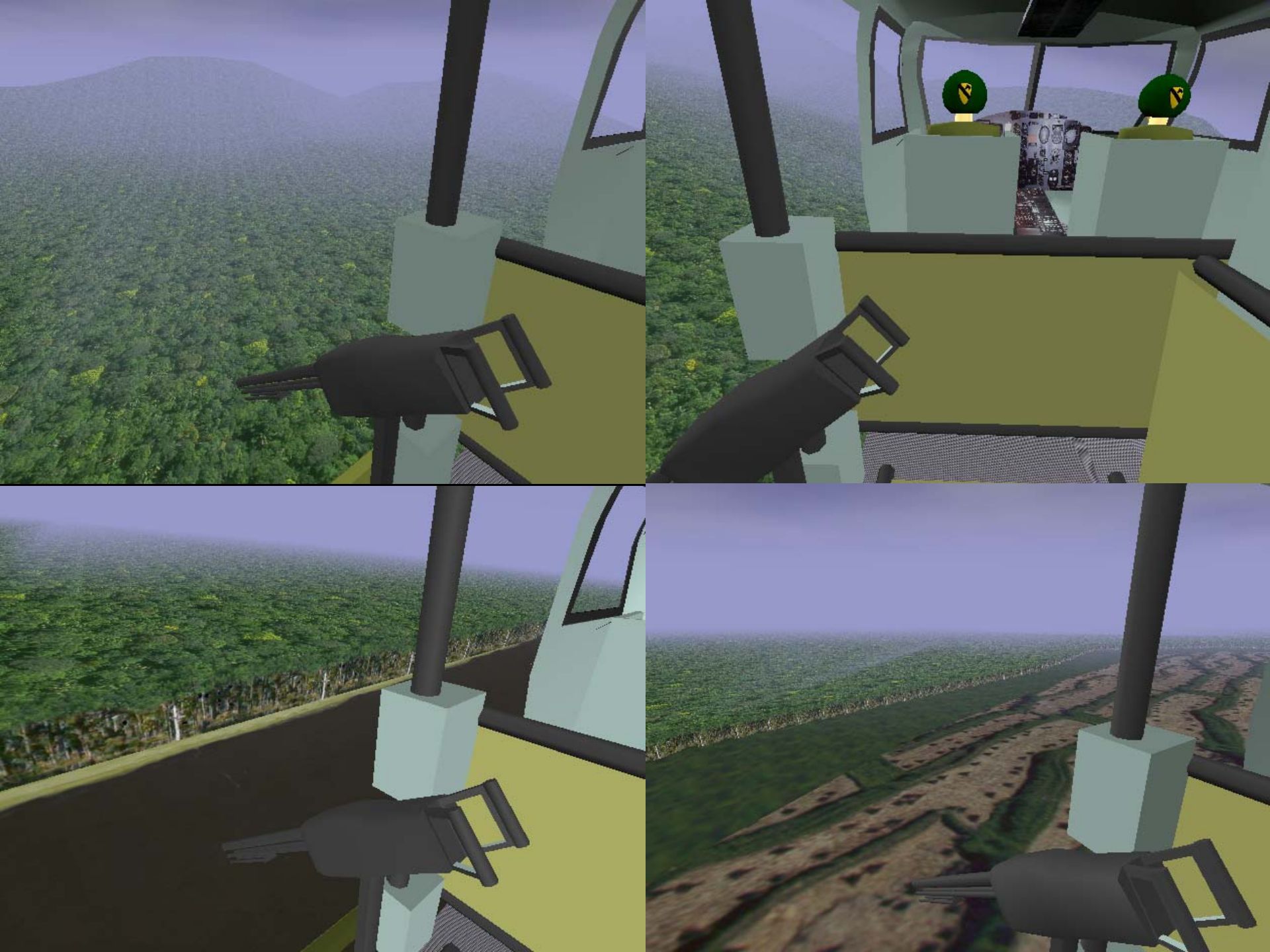

# VIRTUAL VIETNAM

Hodges, Rothbaum, Graap, Pair et al.

**This occurred over 20 years following the end of the Vietnam War.**





# Virtual Vietnam PTSD Studies

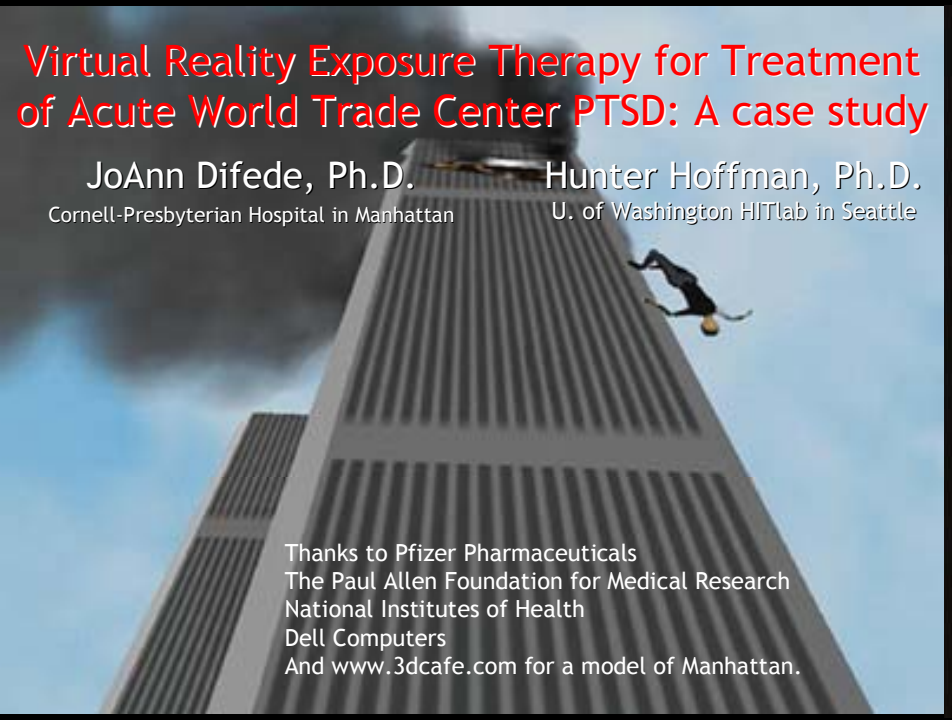
- Ready et al. (1998) – Atlanta VA early pilot study
  - 34% decrease in clinician-rated PTSD symptoms
  - 45% decrease in self-rated PTSD symptoms
- Rothbaum et al. (1999) - case study + at 6-month FU
- Rothbaum et al. (2001) – open clinical trial (n=16)

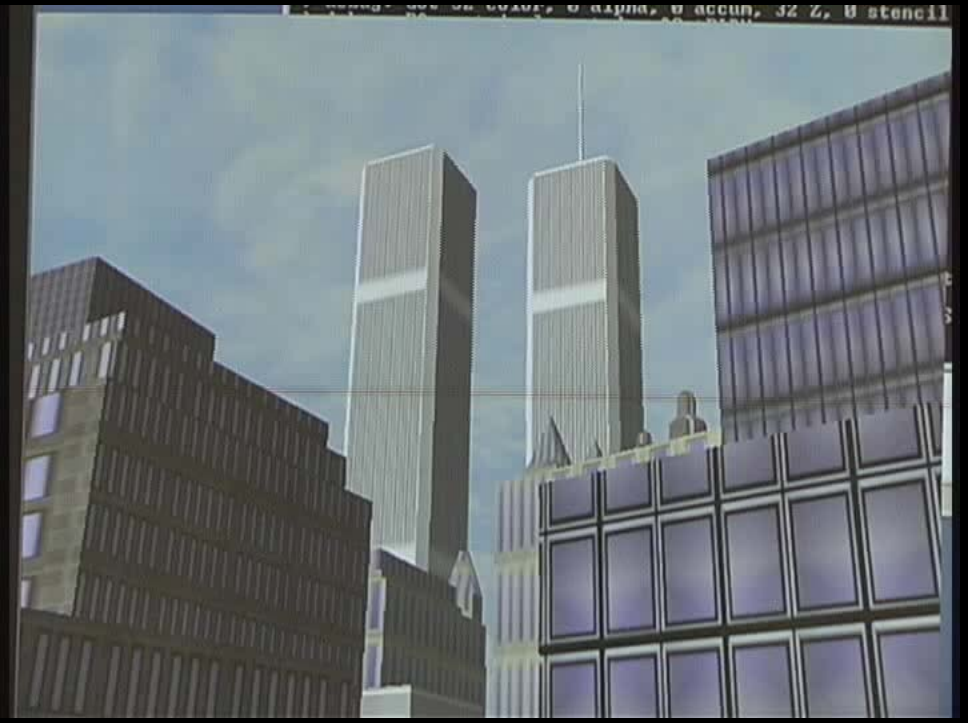
# “*Virtually Healed*” …a Discovery Health Channel Documentary PTSD Segment

4:17

# VR PTSD Examples

- World Trade Center - *Weill Cornell Medical Center/HIT-Lab, Univ. of Washington*



## New Waiting List Control Study Results:

- n = 17
- Active Treatment = Sig. Reduction in CAPS scores
- Six of nine clients showed no gain from previous “imaginal” exposure therapy

Difede, J., Cukor, J., Patt, I., Goisan, C. & Hoffman, H. (2006). The Application of Virtual Reality to the Treatment of PTSD Following the WTC Attack. *Annals of the New York Academy of Sciences*. 1071: 500–501.
and *Journal of Clinical Psychiatry*, 2007.

# VR PTSD Examples

- *Virtual Angola*

Pedro Gamito[1], PhD
Carlos Ribeiro[2], PhD
Luiz Gamito[3], MD
José Pacheco[3], MSc
Cristina Pablo[3]
Tomaz Saraiva[1]

**Portugal – From 1961-1974 war on three fronts:**

- **Mozambique**
- **Angola**
- **Guiné**

***25,000 with Combat Related PTSD***

[1]Universidade Lusófona de Humanidades e Tecnologias, Lisbon, Portugal
[2]Militar Academy, Lisbon, Portugal
[3]Hospital Júlio de Matos, Lisbon, Portugal

# VR PTSD Examples

- *Virtual Angola*

# VR PTSD Examples

- Virtual Vietnam – *Emory University*
- World Trade Center – *Weill Cornell Medical Center/U of Wash*
- Terrorist Bus Bombing - *U. of Haifa/U of Wash*
- Motor Vehicle Accidents – *Univ. of Buffalo*
- Emma's World - *Universitat de València (Spain)*
- Virtual Angola – *U. of Lusófona de Humanidades e Tecnologias, Lisbon*
- Virtual Iraq – *USC Institute for Creative Technologies*





Virtual Iraq
AND NOW VIRTUAL AFGHANISTAN
FUNDED BY
RDECOM
U.S. Army Research, Development and Engineering Command
TATRC
Cutting Edge Medical Technology For Soldier Healthcare
DEPARTMENT OF THE NAVY
USN
ONR
Science & Technology

# FULL SPECTRUM WARRIOR

*X-Box Game Conversion for Iraq War PTSD clients!*



# FULL SPECTRUM WARRIOR

*X-Box Game Conversion for Iraq War PTSD clients!*



# Global FSW PTSD Requirements

- Multiple Scenario Settings
- Selectable User Perspective Options
- Create Library of “Trigger” Stimuli
- Integrate Scent, Vibration and Phys. Props
- Create a Highly Usable “Wizard of OZ” Clinician Interface
- Integrate Physiological Recording into Clinician Interface

**Major Goal: *Customize Graduated Exposure based on Client Needs***

# Virtual Iraq

## Early Prototype of Virtual City

# Virtual Iraq

## Time of Day and Weather Controls


Night Vision

# Virtual Iraq

## City Building Interiors

# Virtual Iraq

## Desert Highway and Village

# Virtual Iraq

## Desert Highway Checkpoint

# Virtual Iraq

## Humvee Interior - Safe View

# Virtual Iraq

## Humvee Turret View

# Virtual Iraq

Humvee Interior *Action* View

# Virtual Iraq

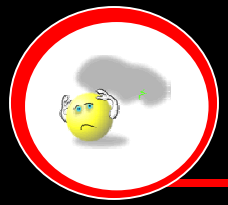
## Humvee Interior *Action* View

# Virtual Iraq

Afghanistan-like Content now being added

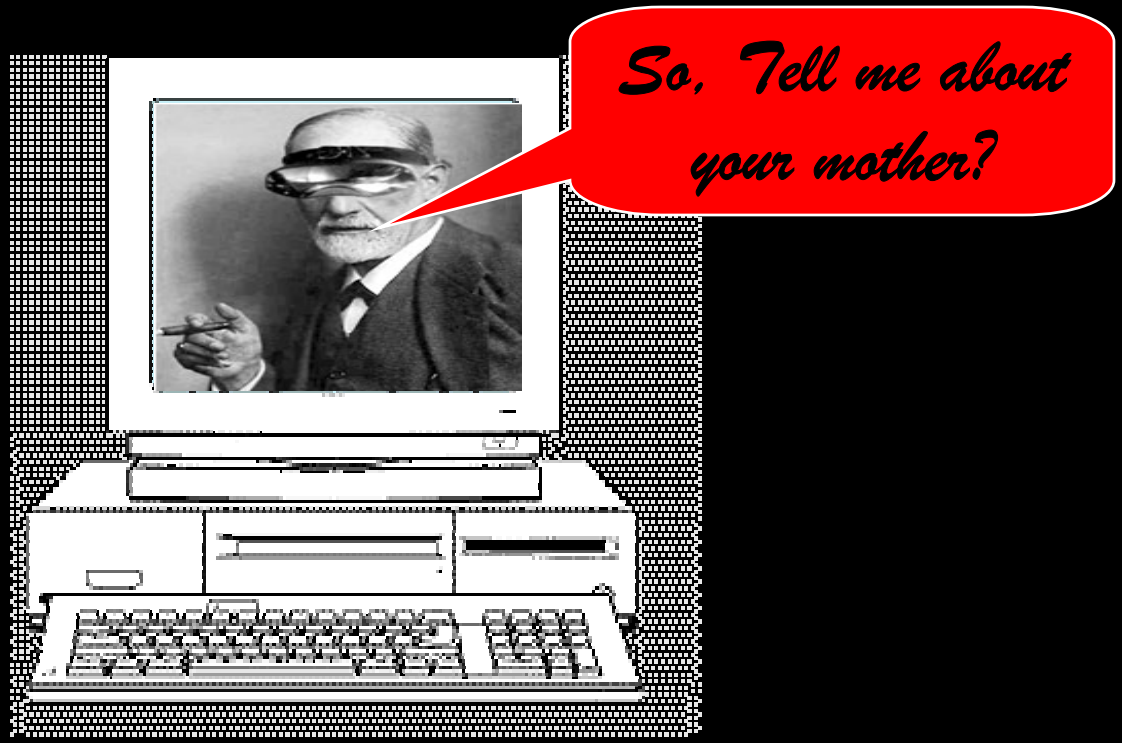
# Virtual Iraq

Afghanistan-like Content now being added



# Challenges

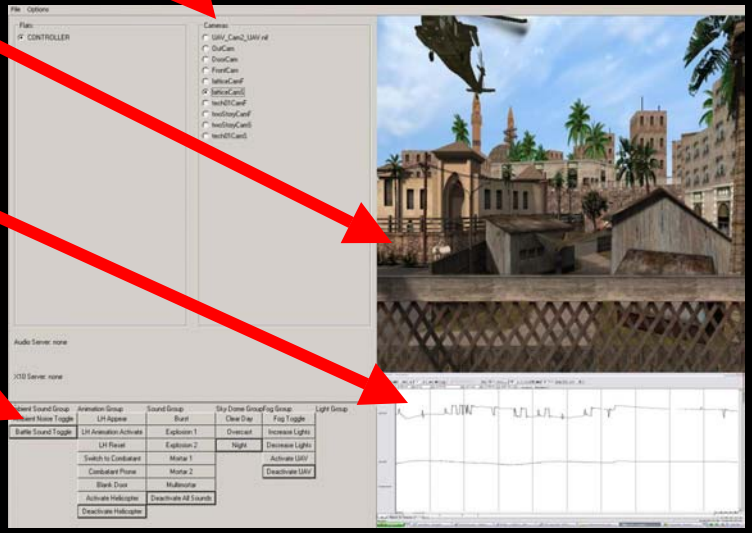
*Caveat:* We need to guard against the perception that VR Tools are designed to eliminate the need for the Clinician



# "Wizard of OZ" Clinician Interface

## *Controls*

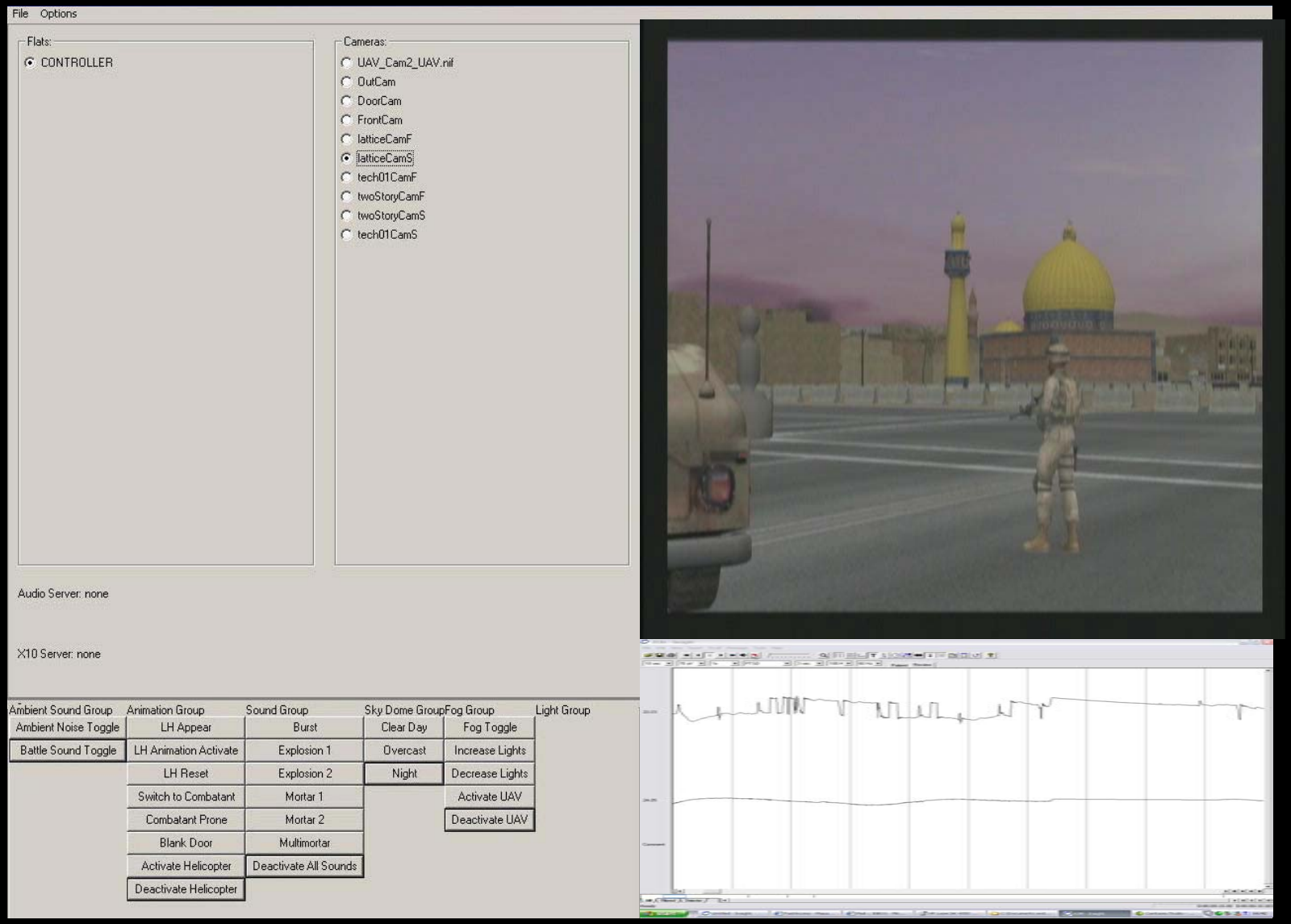
- Scenario Settings
  - Location, Time of Day, Weather, etc.
- User Perspective
  - Alone, Patrol, HUMVEE, Helicopter, etc.
- Real-Time Psychophysiological Display
- TRIGGER Stimuli



# “Wizard of OZ” Clinician Interface

*Option for Wireless Tablet Controls*

# “Wizard of OZ” Clinician Interface

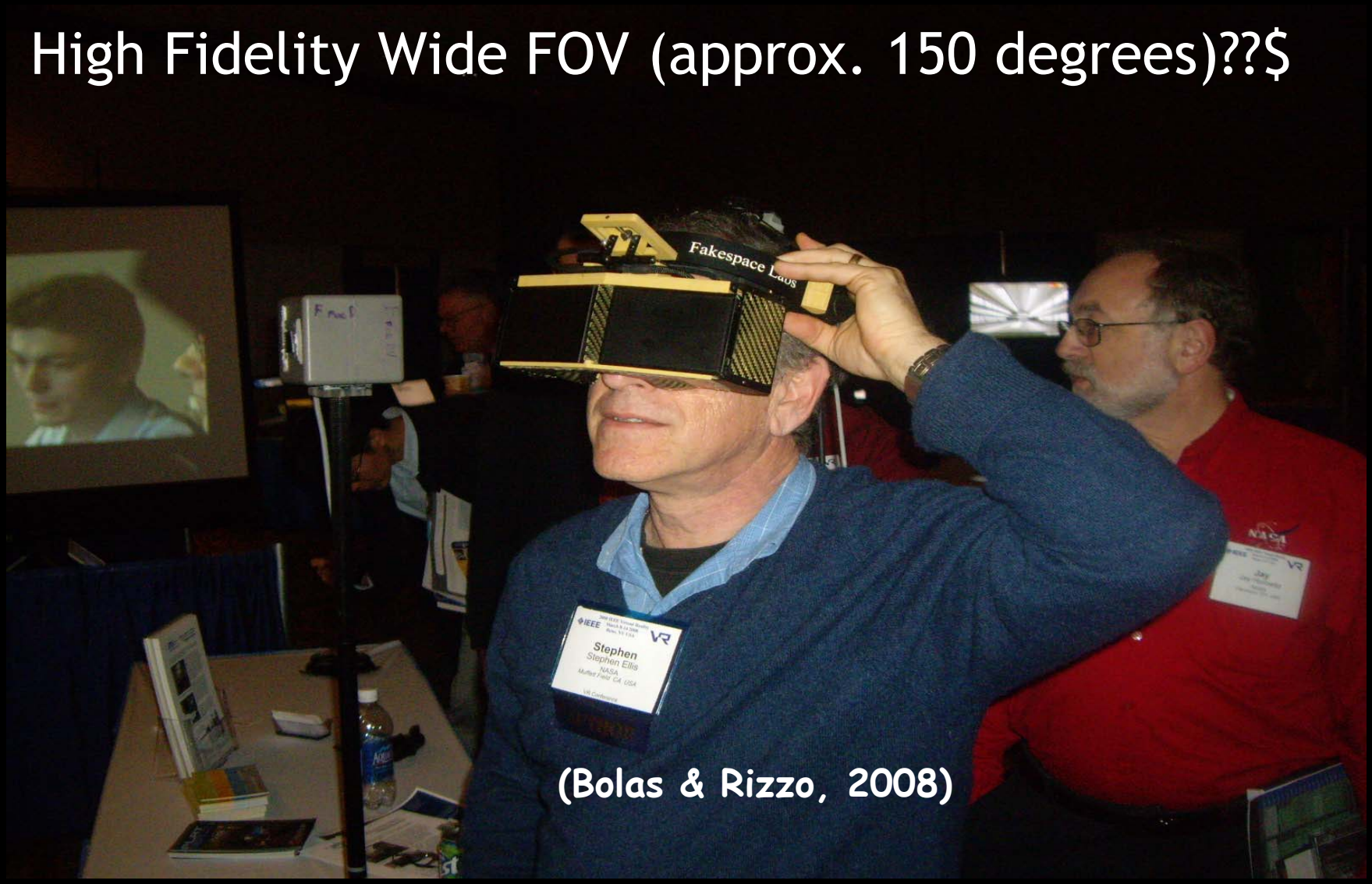


# Low Cost Accessible Display Technology

# Low Cost Accessible Display Technology

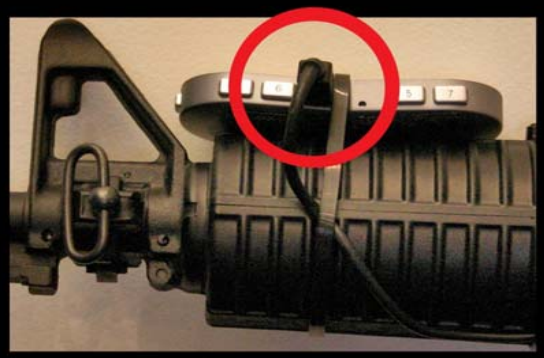
or

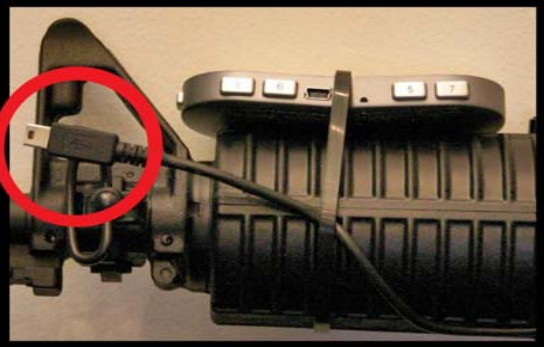
# High Fidelity Wide FOV (approx. 150 degrees)??$

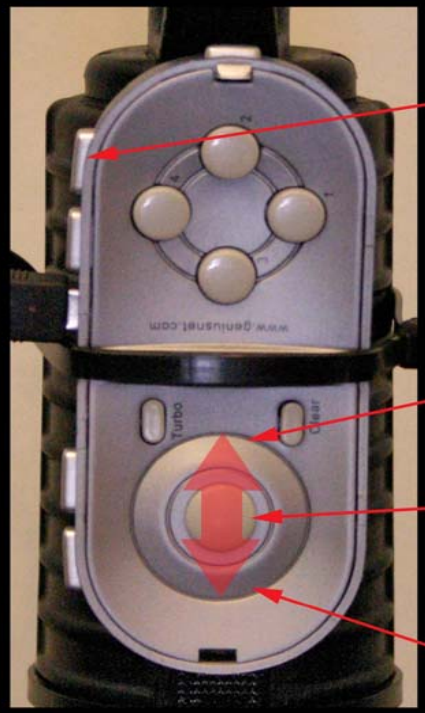



(Bolas & Rizzo, 2008)

# Semi-Natural Navigational Control








# Current Research Activities

- User Centered Trials in *IRAQ* and Ft Lewis
  (Equipment funded by TATRC)

# TATRC-Funded User Centered Design Protocol in *IRAQ*


CPT. GREG REGER PH.D.

98TH MED DET.

COMBAT STRESS CONTROL TEAM

TALLIL AB LSA ADDER IRAQ



# User-Centered Feedback from Iraq and MAMC-Ft. Lewis

- HMD comfort = 7.2/10
- Tracking update = 7.4/10
- Graphic realism = 6.7/10
- Audio realism =7.2/10
- Navigation = 6.2/10
- Side effects = 3/27; 1DC
- Much useful qualitative feedback on architecture, olfactory cues, human content, landscape, etc.

**n=93**

**Reger, Gahm, Rizzo, Swanson & Duma**
**Soldier Evaluation of the Virtual Reality Iraq**

**In Press: *Telemedicine and E-Health***

# Current Research Activities

- User Centered Trials in *IRAQ* and Ft Lewis
  (Equipment funded by TATRC)
- Clinical Trials ongoing at the San Diego Naval Medical Center, Camp Pendleton, Ft. Lewis, Cornell Weill, Walter Reed AMC & Emory Univ. and 12 other military and VA Centers

# Current Research Activities

- Clinical Version 1.6 to be Released July 2008

# Open Clinical Trial Protocol
# Naval Medical Center San Diego

- Session 1
  - Clinical interview to identify the index trauma, provide psychoeducation on trauma and PTSD, and instruction on a deep breathing technique for general stress management purposes.
- Session 2
  - Provide instruction on the use of Subjective Units of Distress (SUDS), the rationale for prolonged exposure (PE), including imaginal exposure and in-vivo exposure. First experience with imaginal exposure of the index trauma and in-vivo hierarchy exposure list was constructed with the first item assigned as homework.
- Session 3
  - Present rationale for VRET and have the participant experience the VR environment without recounting the index trauma narrative for approximately 25 minutes with no provocative trigger stimuli introduced. The purpose of not recounting the index trauma was to allow the participant to navigate Virtual Iraq in an exploratory manner and to function as a “bridge session” from imaginal alone to imaginal exposure combined with virtual reality.
- Sessions 4-10
  - Focus on engagement in Virtual Iraq while recounting the trauma narrative

# Demographics

| Variable | Treatment Completers n=20 |
|---|---|
| Gender | |
| Male | 19 (95%) |
| Female | 1 (5.0%) |
| Age | 28.1 (sd=8.4) |
| Marital Status | |
| Married | 14 (70%) |
| Divorced | 2 (10%) |
| Widowed | 1 (5%) |
| Separated | 1 (5%) |
| Never been | 2 (10%) |

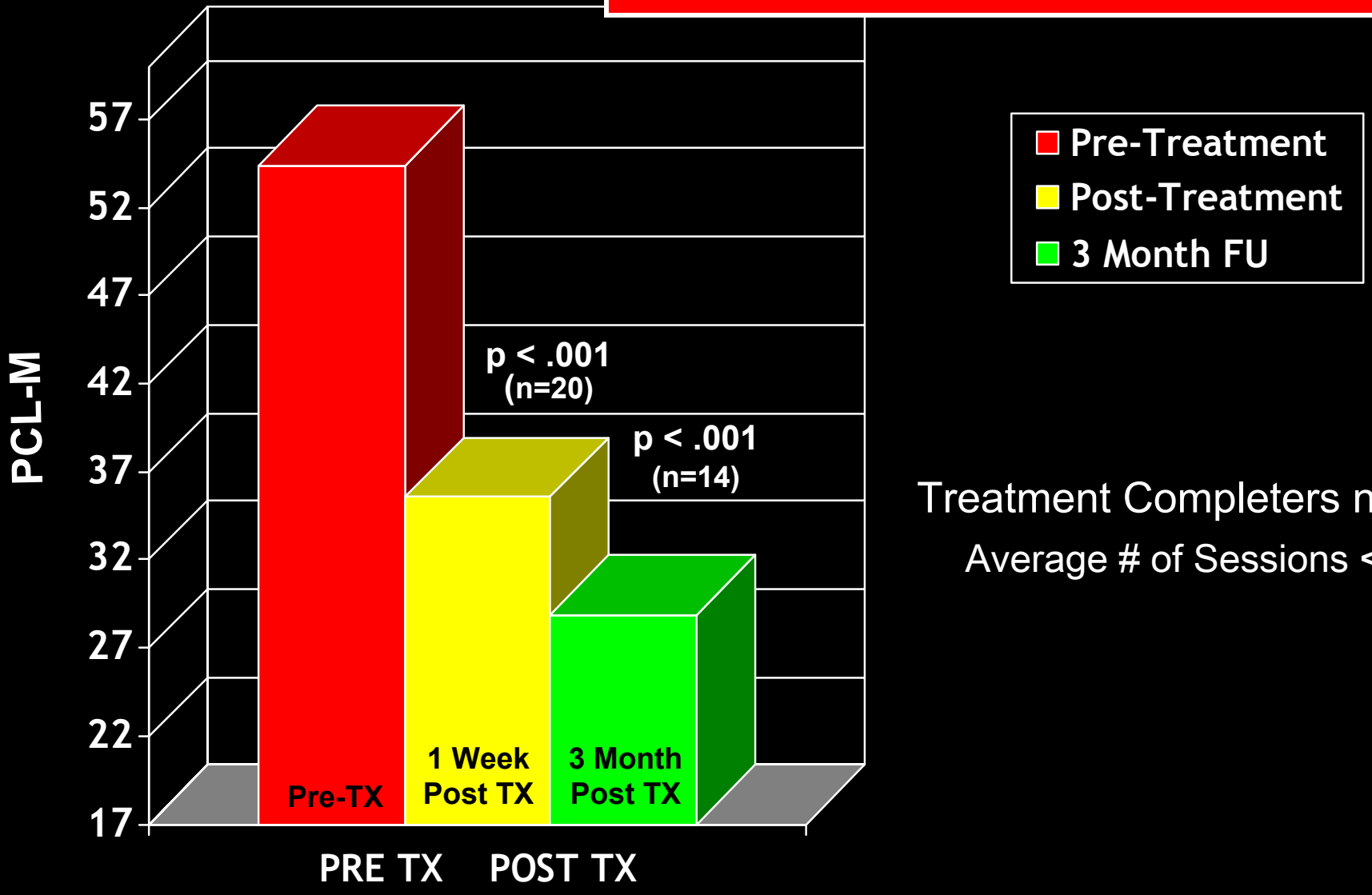
| Variable | Treatment Completers m (sd) |
|---|---|
| Years Service | 8.4 (7.8) |
| Months since last DEPLOYMENT | 8.3 (2.5) |
| DEPLOYMENTS (# in career) | 2.6 (2.1) |
| Branch | |
| Army | 2 (10%) |
| Marines | 18 (90%) |
| Rank | |
| E1-E2 | 2 (10%) |
| E3-E4 | 9 (45%) |
| E5-E6 | 6 (30%) |
| E7-E9 | 3 (15%) |

16 of 20 No Longer meet DSM criteria for PTSD at Post-TX

# Naval Med Center SD/Camp Pendleton

## PTSD Checklist-Military (PCL-M)

PreTreatment, PostTreatment & 3 Month Follow-up



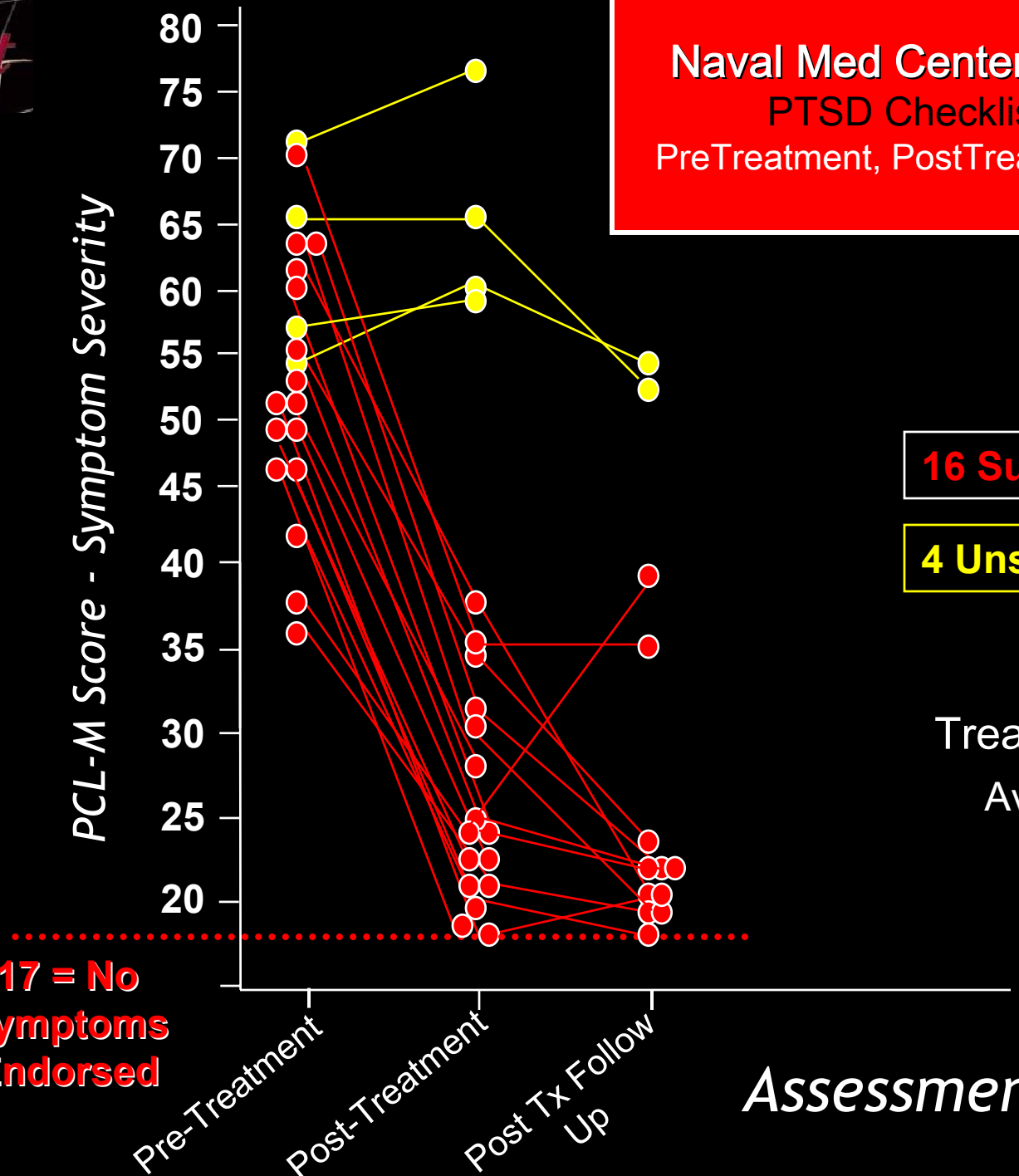

Treatment Completers n=20

Average # of Sessions < 11

# Naval Med Center SD/Camp Pendleton

PTSD Checklist-Military (PCL-M)

PreTreatment, PostTreatment & 3 Month Follow-up




16 Successful

4 Unsuccessful

Treatment Completers n=20

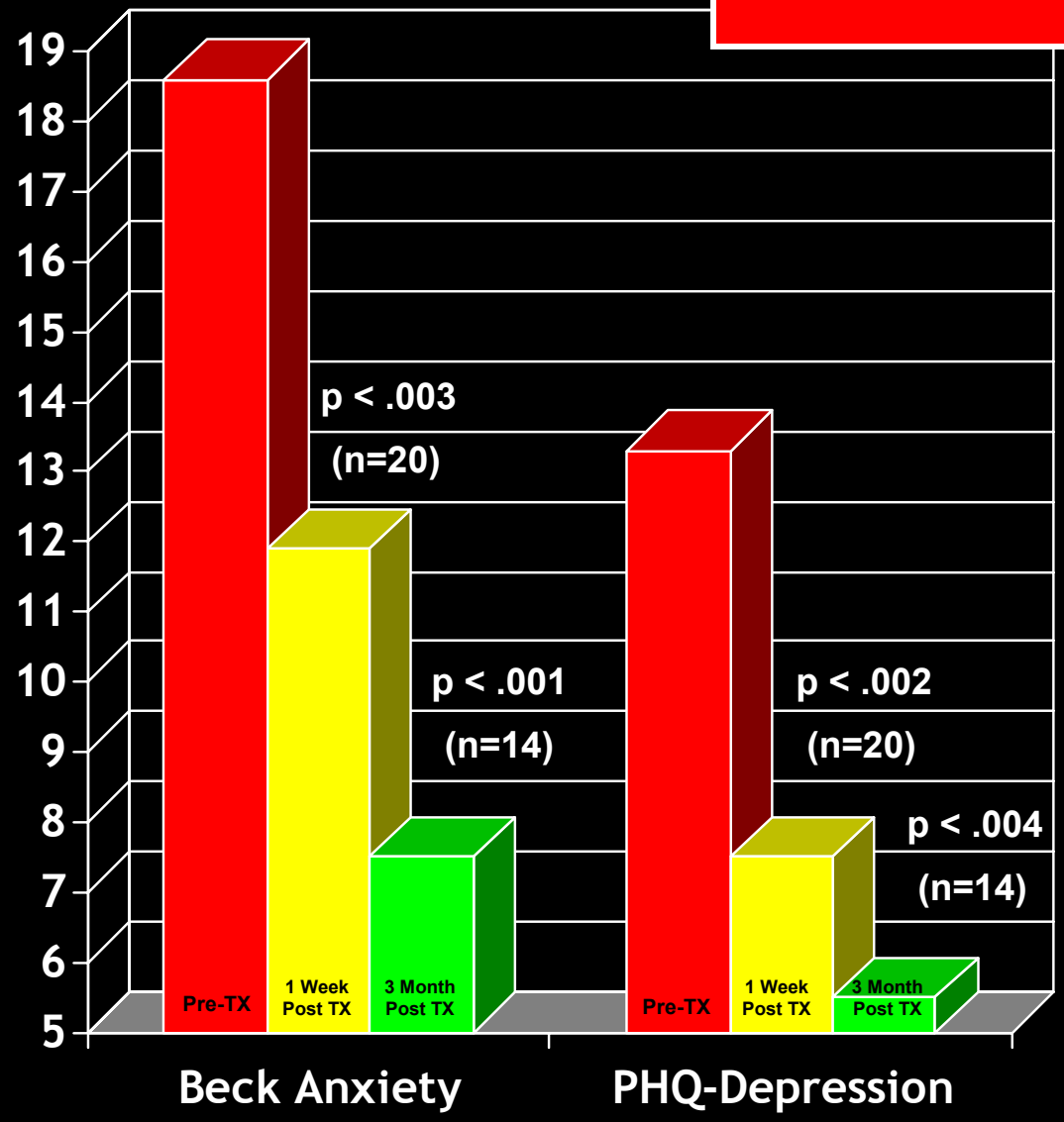
Average # of Sessions < 11

*Assessment over Time*

# Naval Med Center SD/Camp Pendleton

## Beck Anxiety & PHQ Depression

PreTreatment, PostTreatment & 3 Month Follow-up




- Pre-Treatment
- Post-Treatment
- 3 Month FU

Treatment Completers n=20

Average # of Sessions < 12

In Press: Rizzo, Reger, Gahm, Difede & Rothbaum, (2008). *The Neurobiology of PTSD*, Shiromani, P., Keane, T. & LeDoux, J. (Eds.)

# PTSD RESULTS AS OF JULY 2008

Naval Med Center - San Diego/Camp Pendleton Open Clinical Trial

- Treatment completers successful = 16
- Treatment completers unsuccessful = 4

## Challenge: Drop-outs!

- Treatment discontinued BEFORE FIRST Session: = 7
- Treatment discontinued BEFORE FIRST VR Session: 6
- Treatment discontinued *AFTER* FIRST VR Session: 7

13/20 = 65 % of dropouts before full VRET therapy begins in session 4

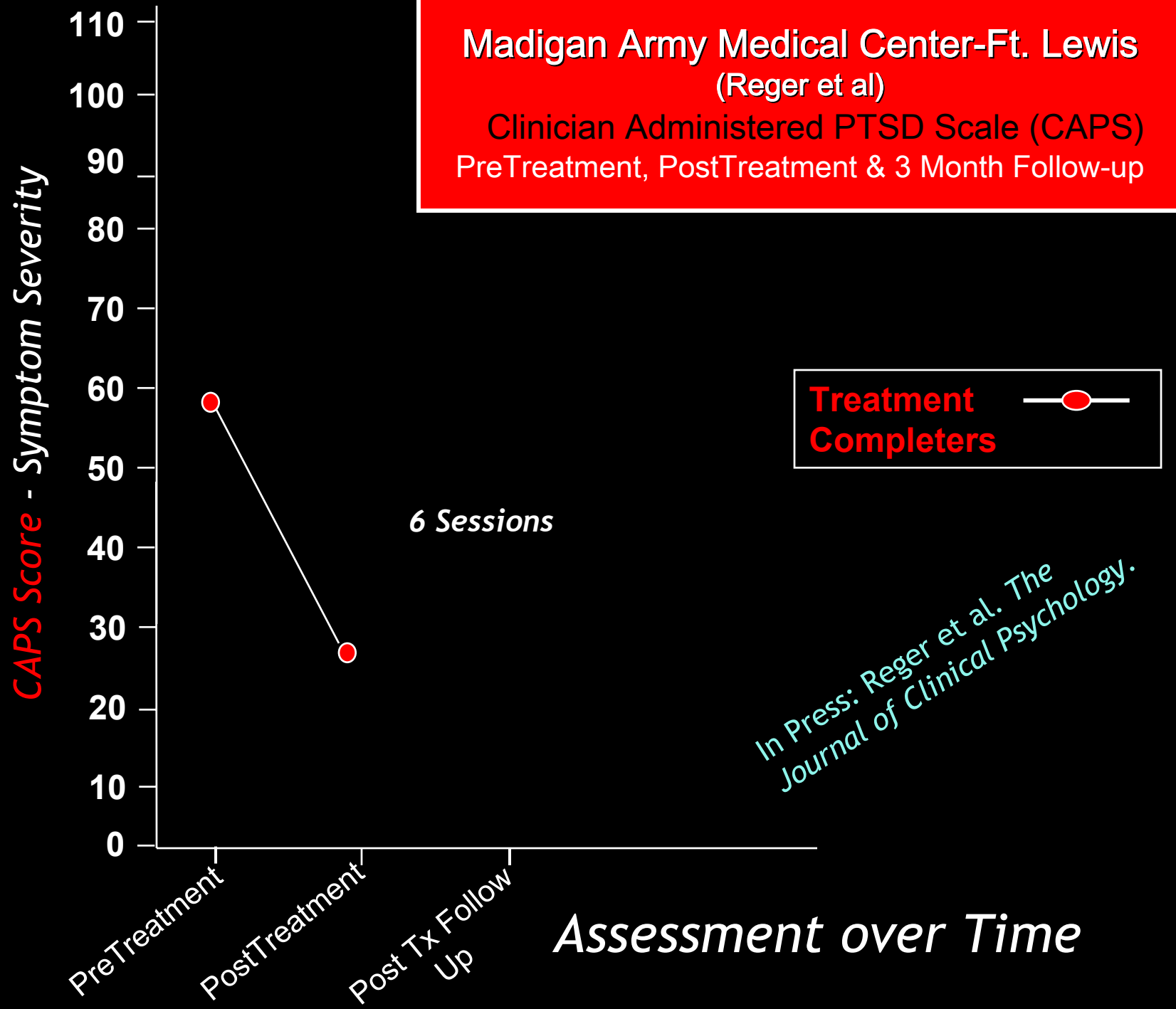
**How does this compare with Military Mental Healthcare attrition Rates???**

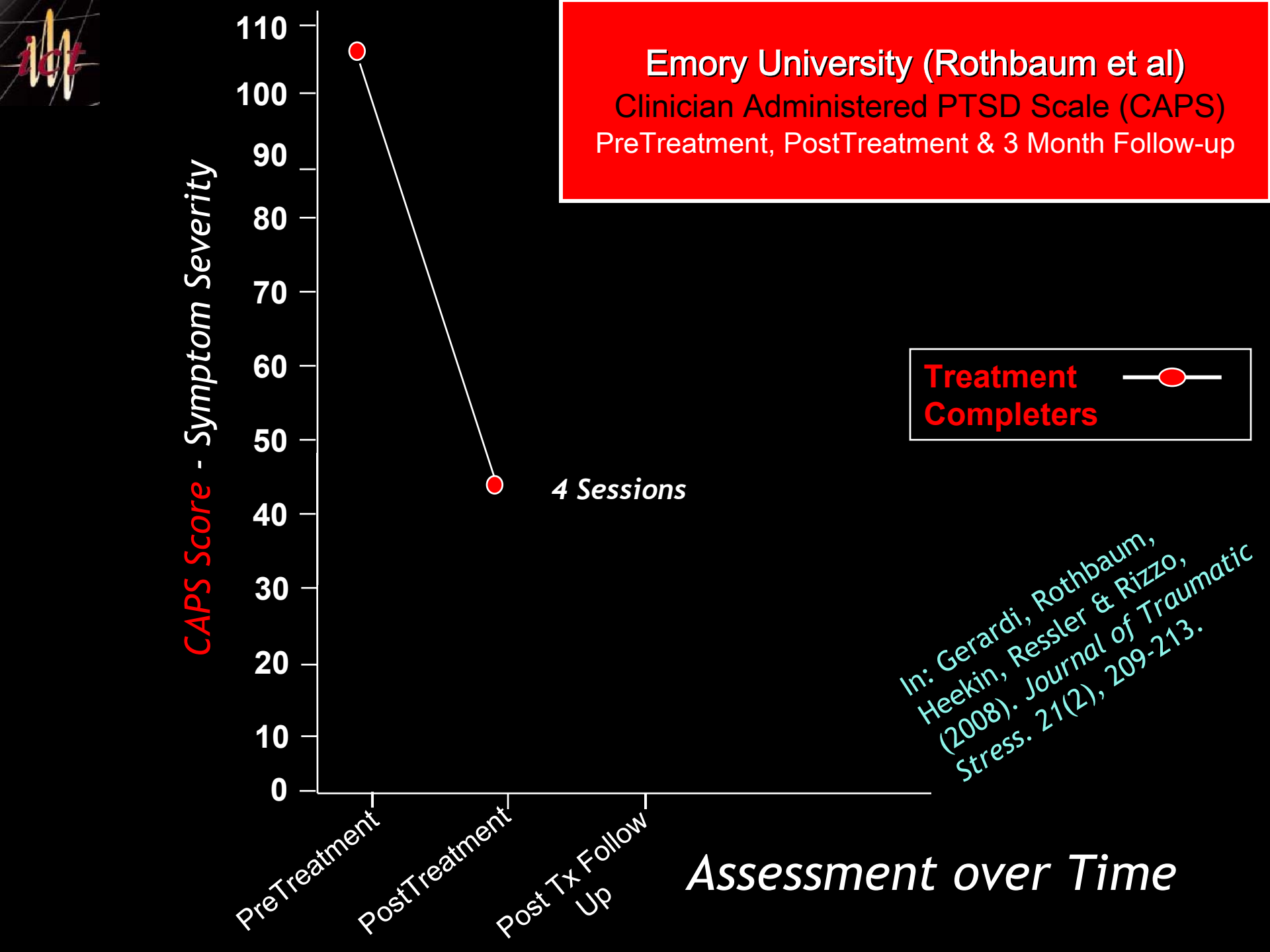
# Madigan Army Medical Center-Ft. Lewis

(Reger et al)

Clinician Administered PTSD Scale (CAPS)

PreTreatment, PostTreatment & 3 Month Follow-up




Emory University (Rothbaum et al)
Clinician Administered PTSD Scale (CAPS)
PreTreatment, PostTreatment & 3 Month Follow-up
CAPS Score - Symptom Severity
110
100
90
80
70
60
50
40
30
20
10
0
4 Sessions
Treatment Completers
In: Gerardi, Rothbaum, Heekin, Ressler & Rizzo, (2008). Journal of Traumatic Stress. 21(2), 209-213.
PreTreatment
PostTreatment
Post Tx Follow Up
Assessment over Time

# Iraq War Veteran Treated by Virtual Reality Therapy

Haunted by Iraq, Soldier Uses Unique Therapy to Cope with Post-Traumatic Stress Disorder

Images such as this are part of the virtual reality treatment for Post-Traumatic Stress Disorder being used to treat soldiers at Emory University. (ABC News)

By DAN HARRIS and DEBORAH APTON
June 7, 2007

From Nightline

Font Size
A A A
E-mail
Print

Sgt. Bryan Neal spent a harrowing and bloody year in Iraq with the Georgia National Guard. He survived dozens of IED attacks. On many occasions, he saw his friends suffer and die.

When he came home, he treated his post-traumatic stress disorder in a way some might find supremely counterintuitive -- by repeatedly reliving his worst memories in virtual reality.

# Recent News Media Reports


November 13, 2007 “Coming Home”


November 14, 2006 “Iraq War Veteran Stories”

# Recent News Media Reports


November 13, 2007 “Coming Home”

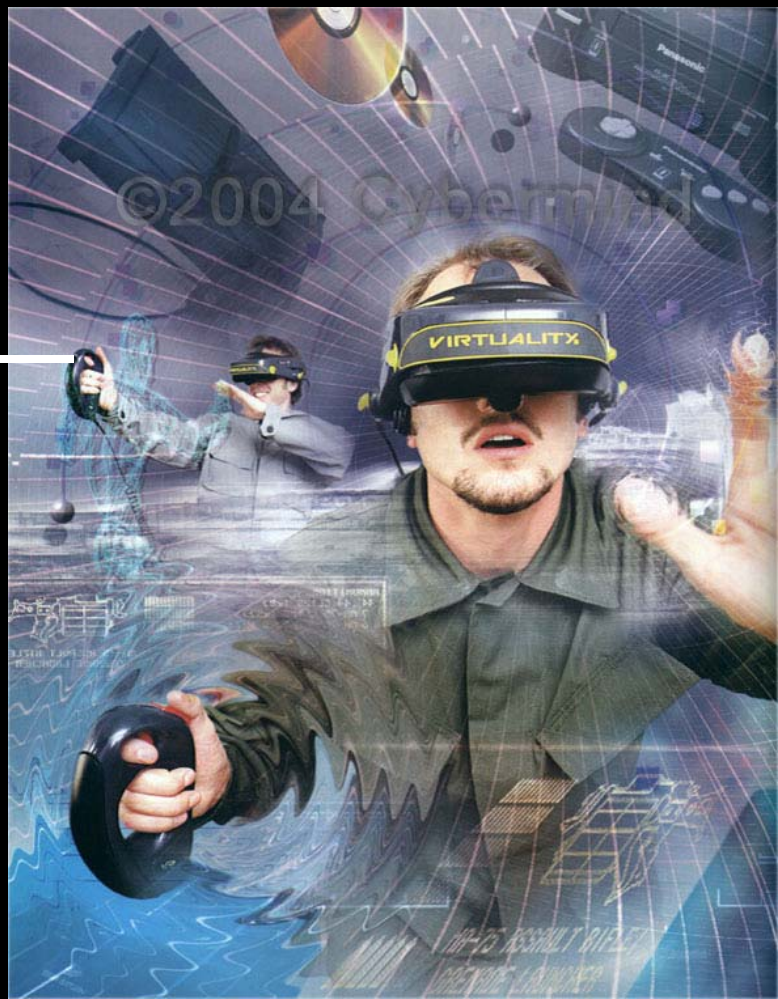
# *Challenge for Military Healthcare*
## *(again from Hoge et al. 2004)*

Among Iraq War veterans: *"…those whose responses were positive for a mental disorder, only 23 to 40 percent sought mental health care. Those whose responses were positive for a mental disorder were twice as likely as those whose responses were negative to report concern about possible stigmatization and other barriers to seeking mental health care."* (p. 13).

# *Challenge for Military Healthcare*

Option: Reconceptualize Therapy → *VR* Post Deployment *Reset Training*

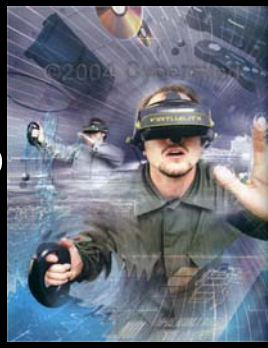
**May appeal to a generation of soldiers who have grown up Digital!**



# Challenge for Military Healthcare

Option: Reconceptualize Therapy → *VR Post-Combat Reintegration Training*

- Integrate VR combat exposure as part of a comprehensive program administered upon return from a tour of duty
- Since past research is suggestive of differential patterns of physiological reactivity in soldiers with PTSD when exposed to combat-related stimuli (Laor et al., 1998, Keane et al., 1998)
- Use initial reintegration procedure that applies our VR PTSD application with physiological recording could be of value
- If indicators of such physiological reactivity are present during an initial VR exposure, a referral for continued "Reintegration training" could be negotiated and/or prescribed



This could provide a format whereby the perceived stigma of seeking help/treatment could be lessened as the soldier would be simply participating in post-combat reintegration "training" in similar fashion to other designated duties to which they are assigned.

# Clinical/Research Test Sites

## Funded by:


- Camp Pendleton
- Naval Medical Center San Diego
- Walter Reed Army Medical Center

## Funded by: NIH, TATRC, VA, DOD, EU:

- Little Rock VA Hospital
- Providence VA/Brown U.
- Atlanta VA Hospital
- Manhattan VA
- Montrose VA
- Brown University
- Fort Lewis, Washington
- Emory University
- Weill Medical College of Cornell
- Ft. Sill
- University of Reading, UK
- University of Esbjerg, Denmark

# RELIVING IRAQ

A Humvee heads up a desert road in Virtual Iraq, an emerging treatment for veterans with post-traumatic stress disorder. At this month's meeting of the American Psychiatric Association in Washington, D.C., psychologist Barbara Rothbaum of Emory University in Atlanta, Georgia, reported promising results for a technique that combines Virtual Iraq with a drug that modifies the brain's fear response. The drug, D-cycloserine, enhances the function of a receptor for the neurotransmitter glutamate—the so-called NMDA receptor—that is critical for memory extinction. Earlier research showed that it helped people reduce their fear of heights (*Science*, 2 April 2004, p. 34).

In each of five sessions, soldiers take the drug and don virtual-reality goggles. Then a therapist guides them through a traumatic memory, most often an encounter with an improvised explosive device. The experience comes with sounds—people yelling, dogs barking, guns discharging, and helicopters whirring—vibrations, and even smells of burning rubber and fuel. "In general, veterans don't respond as well as civilians to drugs or therapy," Rothbaum said, but this combination makes for a "more potent exposure." The researchers have so far enrolled 27 vets, with 1-year follow-ups on three patients. Preliminary data, she said, indicate that two sessions with the drug achieve as much as eight without it.

CREDITS (TOP TO BOTTOM): THE HENRY MOORE FOUNDATION; JEFFREY WALLINE; SKIP RIZZO

www.sciencemag.org SCIENCE VOL 320 23 MAY 2008
Published by AAAS

vis

# The Neuroscience of PTSD

ORIGINAL ARTICLE

A Functional Magnetic Resonance Imaging Study of Amygdala and Medial Prefrontal Cortex Responses to Overtly Presented Fearful Faces in Posttraumatic Stress Disorder

## UNDER REVIEW TO DOD COE/CAM:

Developing Novel Diagnostic and Treatment Tools for PTSD using Virtual Reality Technology, Cognitive Neuroimaging, and other Neurobiological Measures

Rizzo (PI), Damasio, Damasio, Parsons, Lu, Rothbaum, Difede, Reger, Pato, Rubin, Houston & Bechara

**Main Outcome Measures:** We used functional magnetic resonance imaging (fMRI) to study blood oxygen-

*Arch Gen Psychiatry. 2005;62:273-281*

# Future Research Directions

- Spherical Video Exploration
- Enhancing Therapy
- Assess Acute Stress in Theatre
- Assessment of PTSD post-combat
- Potential Aid for Initial Selection
- Stress Inoculation
- Brain/Behavior Issues

# *Why do this work???*

- *Ethical* Responsibility to reduce human suffering
- *Assessment, Diagnosis, Selection* and *Stress Inoculation* applications could prevent or lower PTSD incidence and produce soldiers better equipped for combat
- *Healthcare savings* via a reduction in long term service connected disability

*As of January, 2005 - 13,752 Gulf War Vets receiving VA Benefits for PTSD*

*As of September, 2005 - 19,356 Gulf War Vets receiving VA Benefits for PTSD*

THE NEW YORKER

REPORTING & ESSAYS | ARTS & CULTURE | HUMOR | FICTION & POETRY | THE TALK OF THE TOWN | ONLINE ONLY

MAY 13, 2008

THE NEW YORKER
OUT LOUD
Sue Halpern talks about the use of virtual reality to treat traumatized veterans.

BLOGS
**Goings On**: Charlie Parker, "Design for Living," and more.
**Sasha Frere-Jones** watches Erykah.
**Dana Goodyear** looks inside the L.A. club Largo.
**Victoria Roberts** delves behind her cartoon characters.
**Hendrik Hertzberg** does new math.
**George Packer** monitors the disaster in Burma.
MORE BLOGS

THE NAKED CAMPAIGN

ANNALS OF PSYCHOLOGY

# VIRTUAL IRAQ

*Using simulation to treat a new generation of traumatized veterans.*

by Sue Halpern

MAY 19, 2008



In November, 2004, when he was nineteen years old, a marine I'll call Travis Boyd found himself about to rush the roof of the tallest building in the northern end of Falluja in the midst of a firefight. Boyd, whose first assignment in Iraq was to the security detail at Abu Ghraib prison, had been patrolling the city with his thirteen-man infantry squad, rooting out insurgents and sleeping on the floors of abandoned houses, where they'd often have to remove dead bodies in order to lay out their bedrolls.

With Boyd in the lead, the marines ran up the building's four flights of stairs. When they reached the top, "the enemy cut loose at us with everything they had," he recalled. "Bullets were exploding like firecrackers all around us." Boyd paused and his team leader, whom he thought of as an older brother, ran past him to the far side of the building. Moments after he got there, he was shot dead. Within minutes, everyone else on the roof was wounded. "We had to crawl out of there," said Boyd, who was hit with shrapnel and suffered a concussion, earning a Purple Heart. "That was my worst day."

*The program uses sights, sounds, even smells to evoke, and subdue, painful memories.*

KEYWORDS
Virtual Reality; Virtual Iraq; Veterans; U.S. Soldiers; Psychotherapy; Post-Traumatic Stress Disorder (P.T.S.D.); Iraq War

USC

**Available at: www.NewYorker.com**

**Demonstration after today's talk at the *Virtually Better* BOOTH 1240**

# WAR Sucks!

## But it does drive advances:

- Medicine → Wound to Kill Ratios
  - Civil War = .7
  - WWII =2.4
  - Korea = 2.6
  - Vietnam = 3.0
  - OIF/OEF = 9
- Psychology
- Neuropsychology
- Rehabilitation

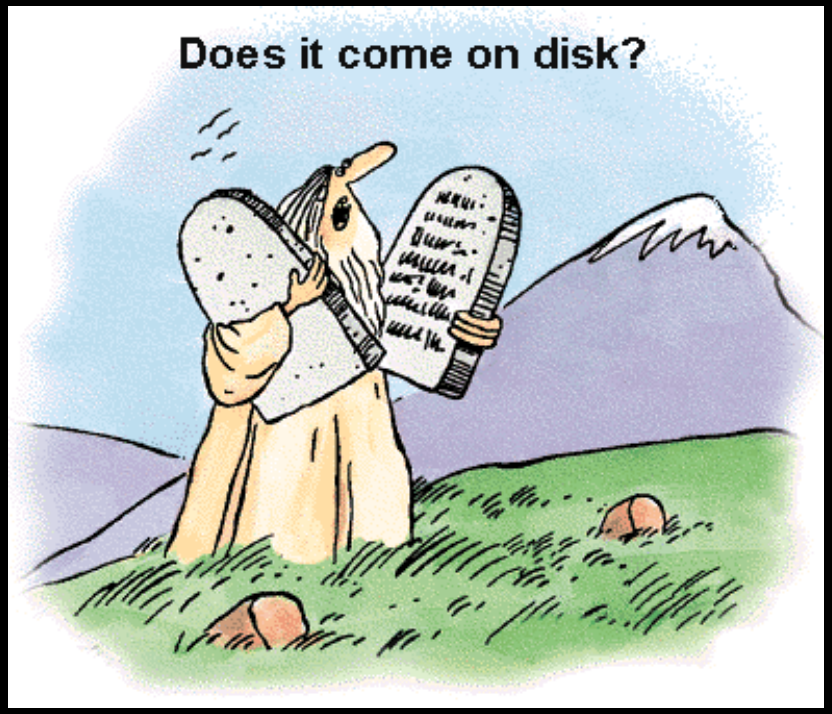
(Fischer, Klarman, and Oboroceanu, 2007)

# WAR Sucks!

## But it does drive advances:

- **WWI** – Army Alpha/Beta Kicks off Civilian IQ Testing Movement
- **WWII** – The birth of Psychology as a clinical profession in the USA & Luria's groundbreaking work with Russian Vets with TBI sets the stage for clinical neuropsychology!
- **Arab-Israeli Wars** – Further drives developments in Neuropsychological Rehabilitation
- **Vietnam War** – Drove recognition of PTSD as a clinical disorder
- **OIF/OEF** – Will it drive advances in TBI, PTSD, Prosthetics, Rehabilitation??

A Copy of this talk will be available for the attendees. Please cite the source if you use any of the materials from this talk.




# A Psychologist's DREAM!?

*The capacity to design a functional environment, precisely administer stimuli, and measure, treat and train performance within the environment.*


"A new century is at hand, and a fast-spreading technology promises to change society forever. It will let people live and work wherever they please, and create dynamic new communities linked by electronics."

- An article about the telephone, 1898

# VR and Mental Health & Rehabilitation Listserve

## "VRPSYCH"

- *Clinicians and Researchers worldwide sharing information on mental health applications using Virtual Environments!*
- *As of 09/2003, 450 professionals in 22 countries!*
- *Email arizzo@usc.edu to sign-up!*


# Virtual Rehabilitation 2008

## (Formerly IWVR)

Vancouver Convention & Exhibition Centre, Canada, August 25-27, 2008

Home »
Call for Participation »
Program »
Conference Committee »
Steering Committee »
Exhibits »
Hotel Information »
Archives »
Join Our Mailing List »

International Virtual Rehabilitation and Telerehabilitation Society



# Home

### *Second Call for Participation - Deadline for ALL submissions is Friday April 11, 2008*

**General Chair and Organizer:** Dr. Joyce Fung, Canada
**Lead Program Chair:** Dr. Patrice (Tamar) Weiss, Israel
**Exhibits Chair and Proceedings Editor:** Dr. Grigore (Greg) Burdea, USA

### *Call for Papers*

Papers related to the use of Virtual Reality in the following areas are solicited:

- Motor Rehabilitation
- Brain Computer Interfaces
- Rehabilitation Robotics and haptics
- Psychological and Environmental Rehabilitation
- Vestibular and Balance Rehabilitation
- Cognitive Rehabilitation
- Telerehabilitation
- Sociological, demographic and legal aspects of Virtual Rehabilitation
- Regulatory, education and formative efforts to promote Virtual Rehabilitation
- Novel applications of game consoles

**Best Paper Award** sponsored by Hocoma AG
**Best Student Paper Award** sponsor by GestureTek Inc.
**Technical Sponsorship** from IEEE EMBS

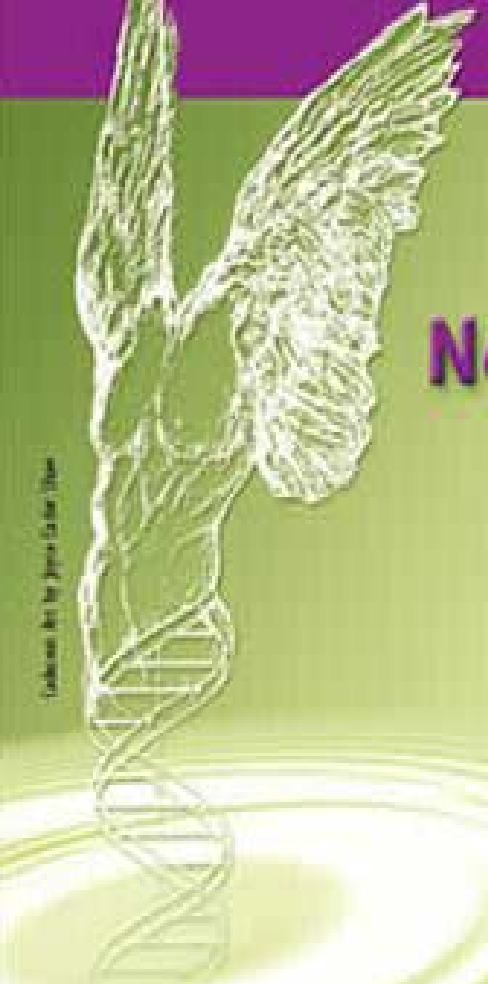
**Special Issue** in a journal is being arranged.


# International Conference on Disability, Virtual Reality, and Associated Technology ICDVRAT 2008

Portugal

September 8-11, 2008

CALL FOR PRESENTATIONS



AMA INC.

# MMVR17

## NextMed: Design for/the Well Being

MMVR is the premier conference on emerging data-centered technologies for medical care and education. It brings together an interdisciplinary, vanguard community of computer scientists and engineers, physicians and surgeons, medical educators and students, military medicine specialists, and biomedical futurists.

MMVR presentations offer a critical review of current progress: from initial vision and prototypes, through assessment and validation, to clinical and academic utilization and commercialization. Extrapolating from the state of the art, MMVR examines and guides the future of healthcare.

This year's MMVR will feature expanded spontaneous interactive environments. **The Well** will merge formal exhibits with casual demonstrations. **Salon** will mingle the visual arts, science, and medicine.

At MMVR, developers and end users collaborate to design the next in medicine. MMVR turns vision into proficy.™

**January 19 – 22, 2009**

**THE HYATT REGENCY LONG BEACH**

Long Beach
California

www.NextMed.com • MMVR17@NextMed.com

*Thanks!*

*Contact Information:*


Albert “Skip” Rizzo, Ph.D.
University of Southern California
Institute for Creative Technologies
Dept. of Psychiatry and School of Gerontology
Los Angeles, California
arizzo@usc.edu
213-740-9819

# The End (for now)



"It would be strange, and embarrassing, if clinical psychologists, supposedly sophisticated methodologically and quantitatively trained, were to lag behind internal medicine, investment analysis, and factory operations control in accepting the computer revolution."

- Paul Meehl, 1987

# The End (for now)


"It would be strange, and embarrassing, if clinical psychologists, supposedly sophisticated methodologically and quantitatively trained, were to lag behind internal medicine, investment analysis, and factory operations control in accepting the computer revolution."

Paul Meehl, 1987