

## Exposure-Based Therapies for Chronic Pain

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## Cognitive/Behavioral Aspects of Pain

- Pain is a common, unpleasant experience that promotes escape/avoidance from situations that cause pain
- In acute pain, escape from harmful situations and withdrawal lead to decreased pain and healing, and a resumption of activities
- In other situations, the pain may not resolve leading to increased fear regarding the nature of the pain
- This fear may not reflect the true nature of the threat, and catastrophic interpretations of benign physical sensations may occur
- Over time, these interpretational errors (such as catastrophizing) lead to the development of pain-related fear

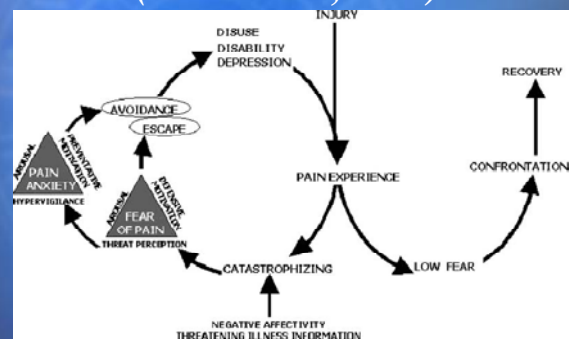
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## Physical and Psychological Consequences of Pain-Related Fear

- Hypervigilance
- Muscular reactivity
- Avoidance of physical activity
- Guarding behavior
- Depression
- Physical disuse and inactivity leading to increased pain/deconditioning, chronic pain

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## Model of Chronic Pain Disability (Leeuw et al., 2007)



## *Kinesiophobia*



- Introduced by Kori et al. (1990) reflecting “an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury”
- These authors published the Tampa Scale of Kinesiophobia (TSK)
- The scale measures two factors, “pathological somatic focus” and “activity avoidance”

## *Is Kinesiophobia a “Phobia”*



- Many argue that chronic pain and chronic fear share key features such as worry, physiological features (muscle activity) and escape and avoidance behavior (Asmundson et al., 1999; Phillips 1987; Vlaeyen and Linton, 2000)
- They differ in that many person with phobias recognize that their fear is excessive and irrational, whereas pain patients view their fear as serving a protective function

## *Evidence for Fear-Avoidance Model*



### *Hypervigilance*

- Several studies have examined the impact of pain or threat of pain on task performance in patients with chronic pain (e.g., Peters et al., 2000; Van Damme et al., 2006)
- Pain or threat of pain induces greater task interference in persons who are high in pain-related fear
- Decreased pain vigilance may mediate the effect of exposure treatment on pain intensity, as pain is not the target of treatment

## *Evidence for Fear-Avoidance Model*

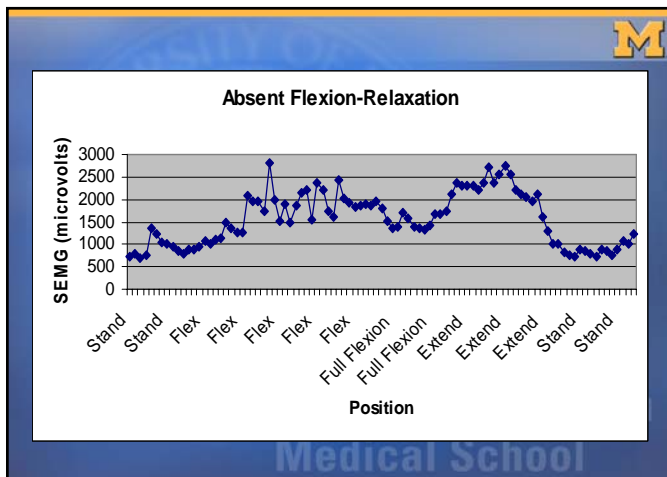


### *Muscular Reactivity*

- Numerous muscle abnormalities associated with chronic pain, particularly chronic low back pain
- Meta-analysis for low back pain concluded that absence of flexion-relaxation (FR) significantly and consistently associated with low back pain ( $d = 1.71$ ; Geisser et al., 2005)
- Absence of FR may be voluntary or involuntary – persons may “brace” their back in response to pain, muscle spasm, or fear of pain (Ahern et al., 1988; Haig et al., 1993)

## What is Flexion-Relaxation?

- First reported by Allen (1948)
- In normals, the paraspinal muscles “relax” when a person is in terminal flexion as the ligaments take on the burden of supporting the trunk
- Reported to occur past 40 degrees of flexion
- This paraspinal relaxation is absent in persons with LBP
- Flexion-relaxation ratio (FRR) typically calculated as maximum SEMG during flexion/average SEMG in full flexion



## Association Between Pain-Related Fear and Flexion-Relaxation (FR)

- Watson et al. (1997) reported a significant relationship between pain-related fear and FR prior to treatment
- Restoration of FR was significantly associated with decreases in fear over the course of multidisciplinary treatment
- Change in range of motion (ROM) or pain over the course of treatment were unrelated to changes in FR

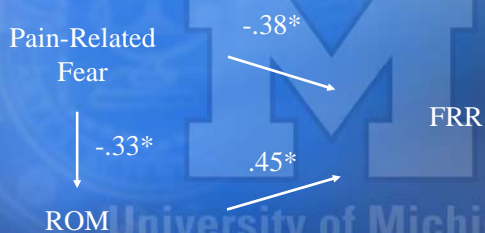
## Pain-related Fear and FR

- Geisser et al. (2004) examined the relationship between pain-related fear and the various components of FR in subjects with chronic LBP (n = 76)
- A flexion-relaxation ratio (FRR) was used to quantify the degree of FR (maximum SEMG in flexion/average SEMG in full flexion)
- The influence of ROM was also examined
- Age, sex, prior surgery, average VAS pain ratings, and compensation and litigation status were controlled for in the analyses

## Correlations Between Fear and SEMG – ROM (Geisser et al. 2004)

Variable	Pain-related Fear
ROM	-.55*
MAX SEMG Flexion	-.38*
AVE SEMG Full-flexion	.02
FRR	-.45*

## Fear, ROM and MAX SEMG During Flexion (Geisser et al., 2004)



## Conclusions

- ROM associated with SEMG during flexion, pain-related fear only indirectly associated through its influence on ROM
- Pain-related fear directly associated with average SEMG in full flexion
- Both ROM and pain-related fear are associated with FRR

## Evidence for Fear-Avoidance Model Disability

- Crombez et al. (1999) asked patients with chronic low back pain to rate the degree of pain they anticipated they would experience during a lifting task
- Clinical pain before and during the task were also assessed
- Best predictor of task performance was anticipated pain
- Pain-related fear was significantly associated with anticipated pain

## Evidence for Fear-Avoidance Model Disability

- Geisser et al. (2000) examined the influence of several factors on functional performance in persons with chronic low back pain
- Patients were assessed on the length of time they could assume certain static or dynamic postures, and the percentage of expected weight lifted on the progressive isoinertial lifting evaluation (PILE)

## Results – Geisser et al. 2000

Simultaneous Regression Analysis of Psychological and Physical Factors and Performance on the Floor to Waist Portion of the PILE.

Variable	Beta	t-ratio	p-value
Pain Duration	.06	0.76	n.s.
Sex	.02	0.20	n.s.
Litigation	-.20	-2.65	< .01
Compensation	-.06	-0.80	n.s.
McGill Total PRI	.16	0.57	n.s.
BMI	-.10	-1.40	n.s.
MET	.09	1.20	n.s.
Maximum HR	.27	2.78	< .01
BORG	.32	3.53	< .001
CES-D	.00	0.04	n.s.
TSK-2 Avoidance	-.23	-2.68	< .01
TSK-2 Fear	.10	1.25	n.s.

## Evidence For Fear-Avoidance Model Chronic Pain

- Longitudinal studies have found that pain-related fear and catastrophizing significantly predict the development of chronic pain among persons with acute pain (Picavet et al., 2002)
- Persons high in pain-related fear may be less likely to resume normal activities and persist in seeking out biomedical explanations for their pain (Hadjistavropoulos and Kowalyk, 2004; Kerns et al., 1999)

## Exposure Therapy-Which Activities?

- Research on exposure interventions suggest that clinicians need to target specific feared behavior, as little generalization occurs to other physical activities (Goubert *et al.*, 2005)
- How physical should be encourage patients to be?

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## Assessment of Pain-Related Fear

- Self-report measures:
  - TSK
  - Fear-Avoidance Beliefs Scale (FABQ; Waddell et al., 1993)
  - Pain Anxiety Symptoms Scale (PASS; McCracken et al., 1992)
  - little data on what score constitutes “kinesiophobia”
- Measure of Fear of Specific Activities
  - Photographic Assessment of Daily Activities (PHODA)
  - consists of 98 photographs of daily light-normal activities such as lifting a child, mopping the floor, riding a bicycle, and lifting a crate from the trunk of a car
  - Persons rate how harmful they feel the movement would be to their back using a 0-100 scale

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## Graded In-Vivo Exposure for Pain-Related Fear (Vlaeyen *et al.*, 2002)

- Graded in-vivo exposure provides disconfirmation of expectations of pain and harm
- Repeated, graded, and controlled exposures are likely to produce the largest and most powerful disconfirmations
- Graded exposure differs from graded activity
- Target activities based on individual assessment of patient

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## Graded In-Vivo Exposure for Pain-Related Fear

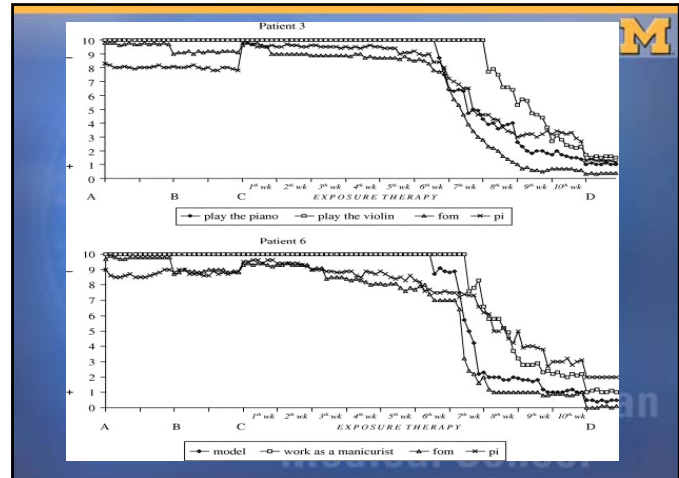
- Target of therapy is restoration of function
- What patient is exposed to depends on evaluation and mutually determined treatment goals
- Education is provided (fear-avoidance model, diagnostic tests, written materials such as the *Back Book*)
- Exposure in-vivo (therapist models behavior, patient performs behavior until fear decreases)
- Behavioral experiments (have patient challenge catastrophic thoughts)
- Homework assignments/generalization

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## Evidence for In-Vivo Exposure

- Single-case studies and case-control cross-over designs (Boersma *et al.*, 2004; de Jong *et al.*, 2005; Linton *et al.*, 2002; Vlaeyen *et al.*, 2001, 2002)
- Studies show improvements in function and pain over time, some show exposure superior to graded activity

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## Primary Prevention Study

- Buchbinder *et al.* (2001) conducted media campaign in Australia (state of Victoria) encouraging persons with back pain to stay active and exercise (based on the *Back Book*)
- Conducted phone surveys and sent physicians two scenarios regarding the treatment of low back pain
- Compared responses to persons/physicians in an adjacent state (New South Wales)

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## Back Book (Burton *et al.*, 1999)

- Excerpt from information booklet *The Back Book* \*
- It's your back
- Backache is not a serious disease and it should not cripple you unless you let it. We have tried to show you the best way to deal with it. The important thing now is for you to get on with your life. How your backache affects you depends on how you react to the pain and what you do about it yourself.
- There is no instant answer. You will have your ups and downs for a while—that is normal. But look at it this way
- There are two types of sufferer
- *One who avoids activity, and one who copes*
- \* The *avoider* gets frightened by the pain and worries about the future
- \* The *avoider* is afraid that hurting always means further damage—it doesn't
- \* The *avoider* rests a lot and waits for the pain to get better
- \* The *coper* knows that the pain will get better and does not fear the future
- \* The *coper* carries on as normally as possible
- \* The *coper* deals with the pain by being positive, staying active, or staying at work

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### *Buchbinder et al., 2001 (Continued)*

- Measures obtained from 4730 individuals and 2556 general practitioners
- Decrease in fear-avoidance beliefs in Victoria over time, but not in New South Wales
- Significant improvement in back pain management among physicians in Victoria (decrease in ordering tests, prescribing bed rest)
- 15% decrease in absolute number of back claims, reduction of 20% of costs for a back claim

### *Randomized Clinical Trials of In-Vivo Exposure*

- Bliokas et al. (2007) randomized 143 patients with chronic low back pain to usual pain management (CBT and goal-setting), pain management with in-vivo exposure, or a wait-list control
- The two treatments were found to be equivalent
- No control or selection for level of pain-related fear

### *Randomized Clinical Trials of In-Vivo Exposure*

- Linton et al. (2008) randomized 46 patients with high fear (TSK>35) and work disability to exposure and usual treatment or wait-list and usual treatment
- Between group comparison showed patients treated with exposure improved in function, but not in terms of pain or fear
- For all patients treated, effect sizes pre- to post- were large for all outcomes (function = .7, fear = 1.1, pain = .9)
- Attrition rate was high (16 subjects over the course of the study)
- Authors concluded exposure improved function, recommended that it be used as an adjunct to other treatment

### *Randomized Clinical Trials of In-Vivo Exposure*

- Leeuw et al (2008) compared exposure to graded activity in 85 moderate to high fear subjects (TSK > 33) with chronic low back pain
- Exposure was not superior to graded activity in terms of improving function, but difference almost statically favored exposure
- Decreases in fear and catastrophizing mediated the effects of exposure
- Treatment effects were maintained at 6 months

## Conclusions and Future Challenges

- When is pain-related fear adaptive or dysfunctional? Is it a matter of how long it persists?
- Are there differences in the influence of pain-related fear on pain experience in different pain conditions?
- More research is needed on exposure as an intervention, what adjuncts enhance treatment outcome
- What level of fear is needed to benefit from exposure?
- How accepting are patients and practitioners of this approach to treating pain?

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## References for In-Vivo Exposure Intervention

- Vlaeyen JWS, de Jong J, Siebert J, Crombez G. Graded exposure in vivo for pain-related fear. In: DC Turk, RJ Gatchel (eds), *Psychological approaches to pain management: a practitioner's handbook*. New York: Guilford Press, 2002: 210-233.
- Vlaeyen JWS, de Jong J, Leeuw M, Crombez G. Fear reduction in chronic pain: graded exposure in vivo with behavioral experiments. In: GJ Asmundson, JWS Vlaeyen, G Crombez (Eds.), *Understanding and Treating Fear of Pain*. Oxford England: Oxford University Press, 2004.

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