Overview of Evidence-Base for Current TMD Treatments

National Academy of Medicine

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TMD Therapies - Questions to Address:

1. Overview of the range of current treatments for TMD.
2. Strengths and limitations of the evidence for each of the major types of treatments.
3. Where is the evidence lacking?
4. What are recommendations and priorities for research to strengthen the evidence base.

TMD RCT Methodological Background

The Evidence Pyramid: Types of Studies

Levels of Evidence: Treatment

Less bias

More bias

1 - 1 or more *randomized controlled trials*

2 - 1 or more *cohort studies*

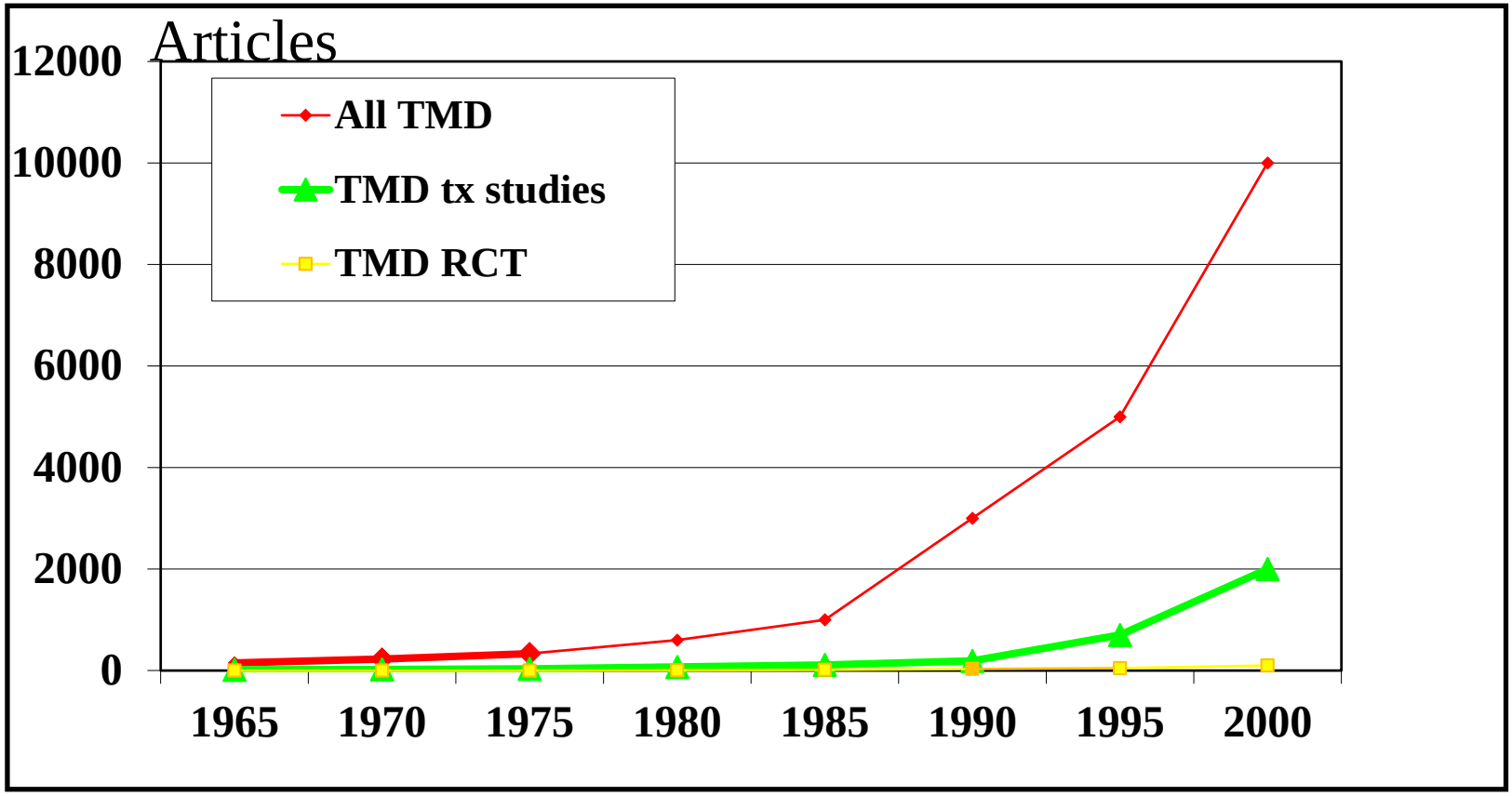
3 - 1 or more *case-control studies*

4 - 1 or more *case-series*

5 - *expert opinion* without above evidence

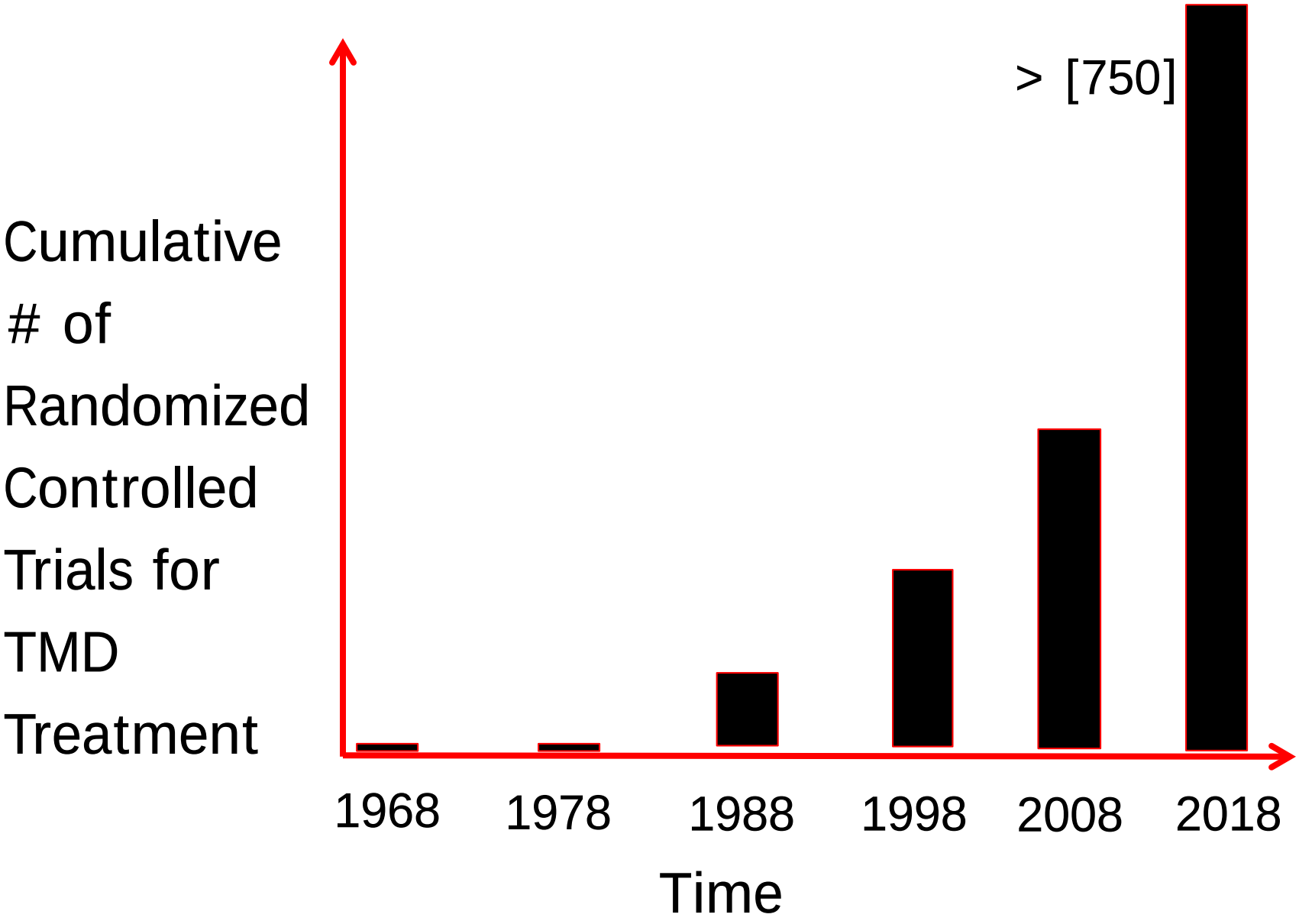
Bias = systematic error

Cumulative number of scientific articles per year about TMD, 1965 - 2000



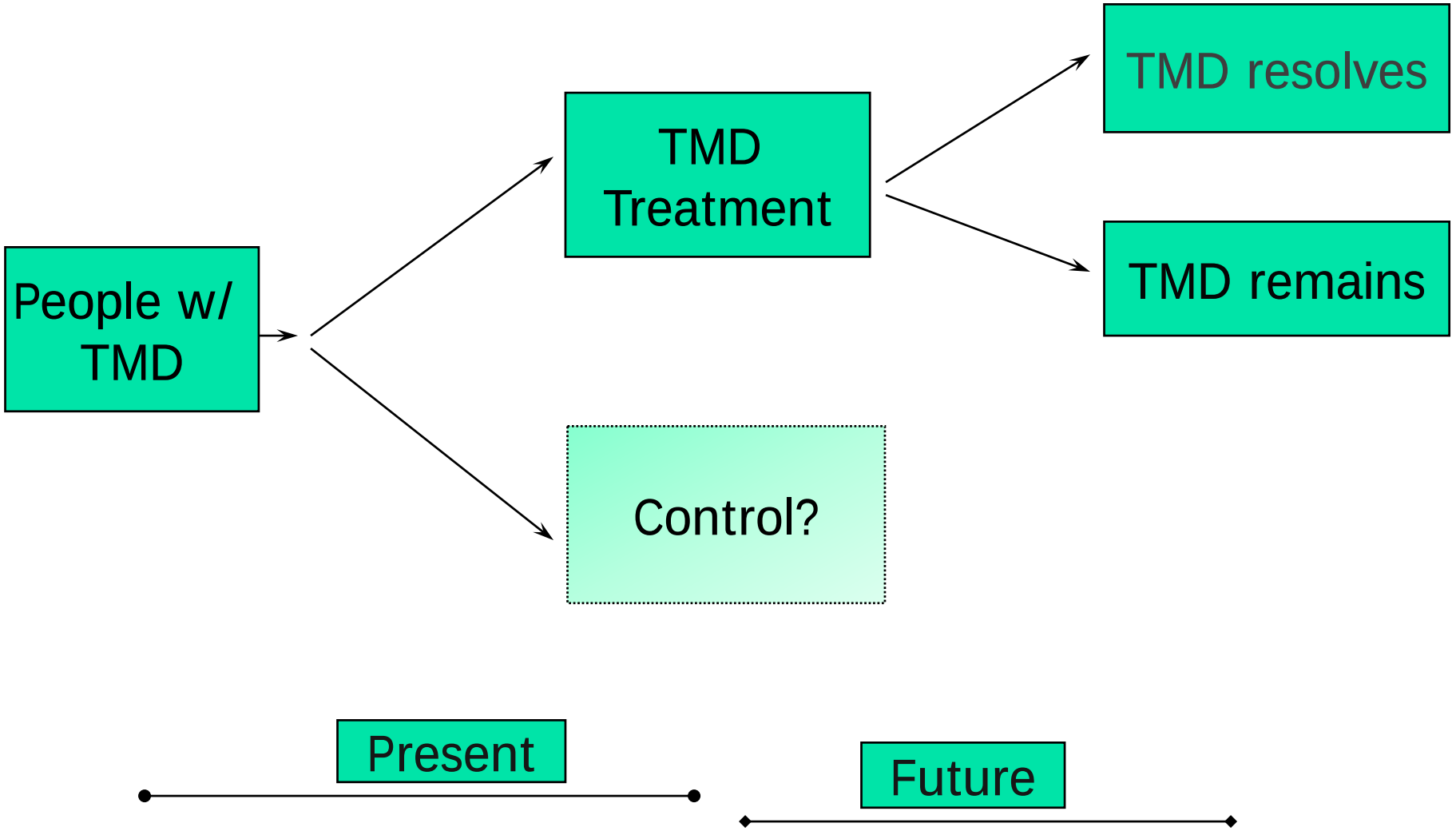
N= 27,380 articles with ‘temporomandibular’ on [3 28 19]

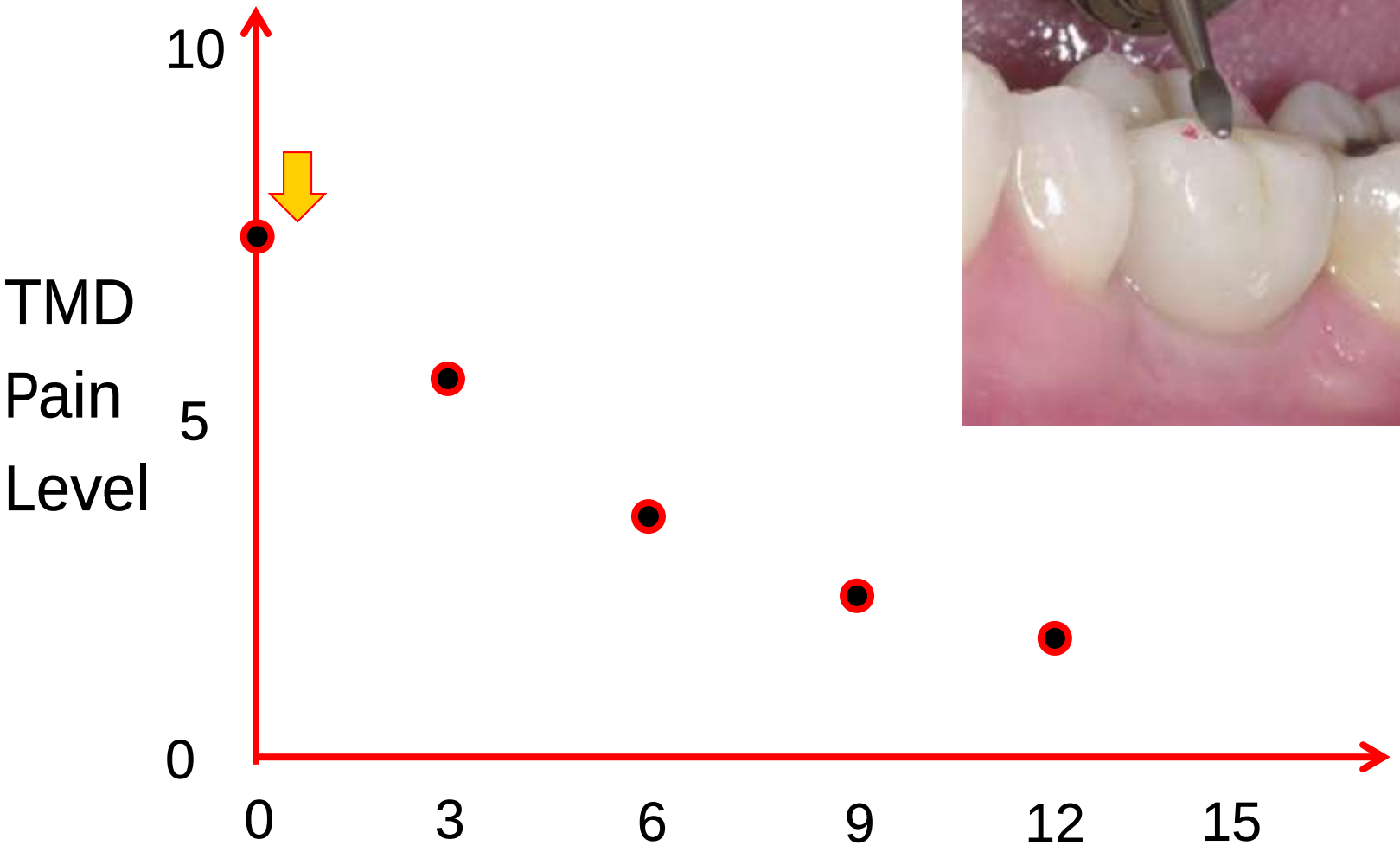
N= [8400] articles with ‘temporomandibular disorder therapy’



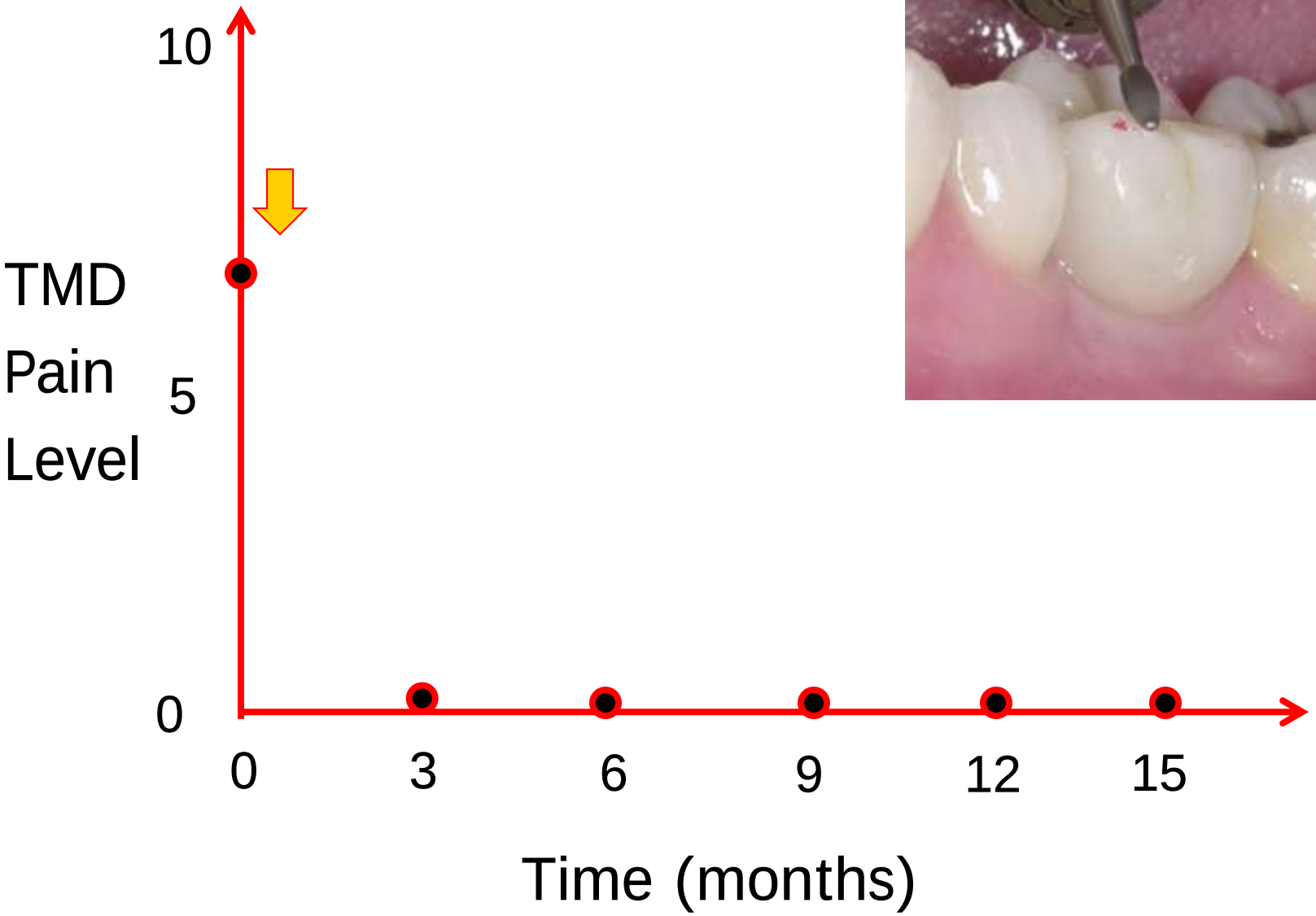
More randomized trials completed in last [10] years than all years combined

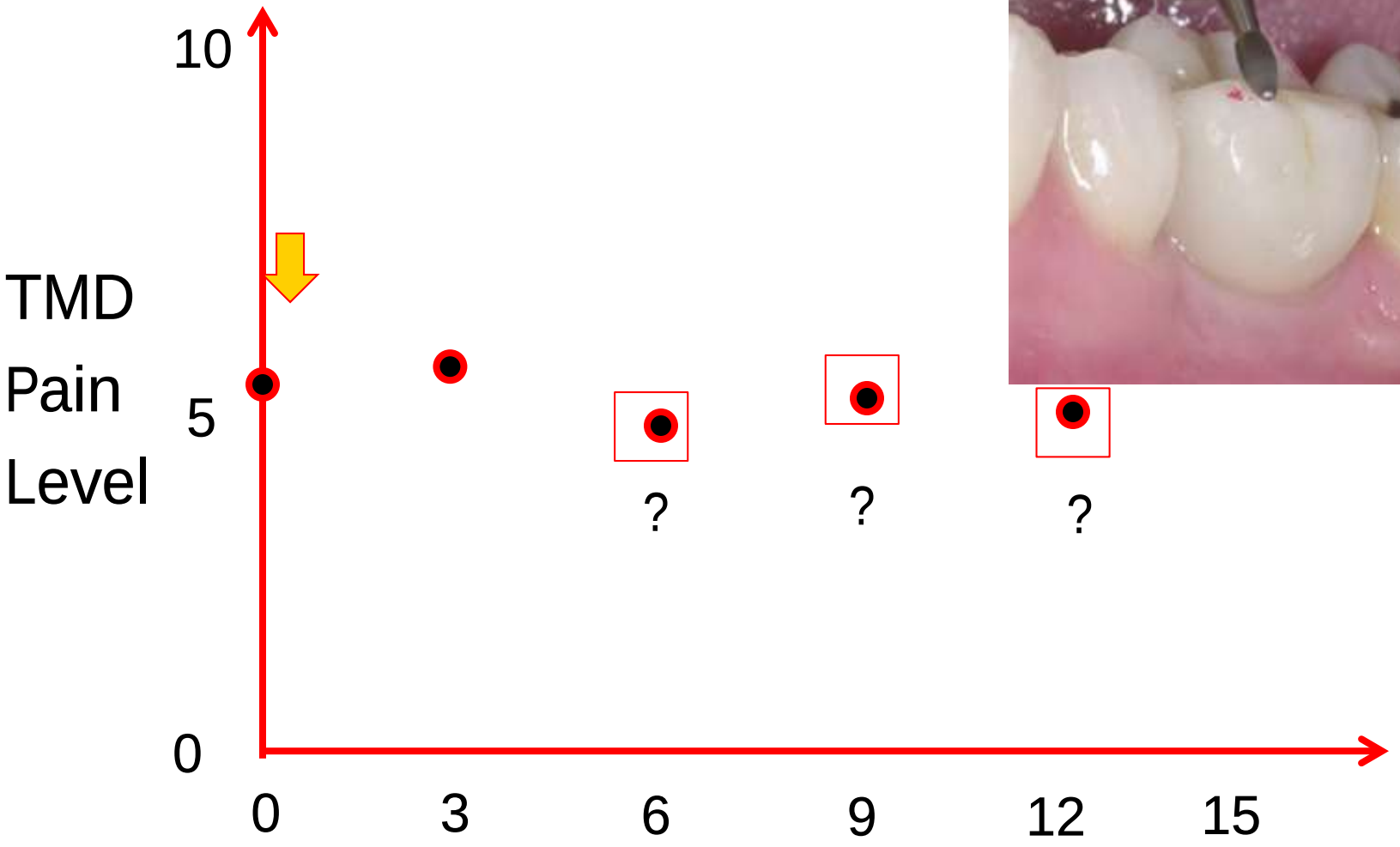
Clinical care:
Case-series or follow-up of treated cases





Single case of TMD pain after occlusal adjustment


10
TMD
Pain
Level
5
0
0
3
6
9
12
15
Time (months)

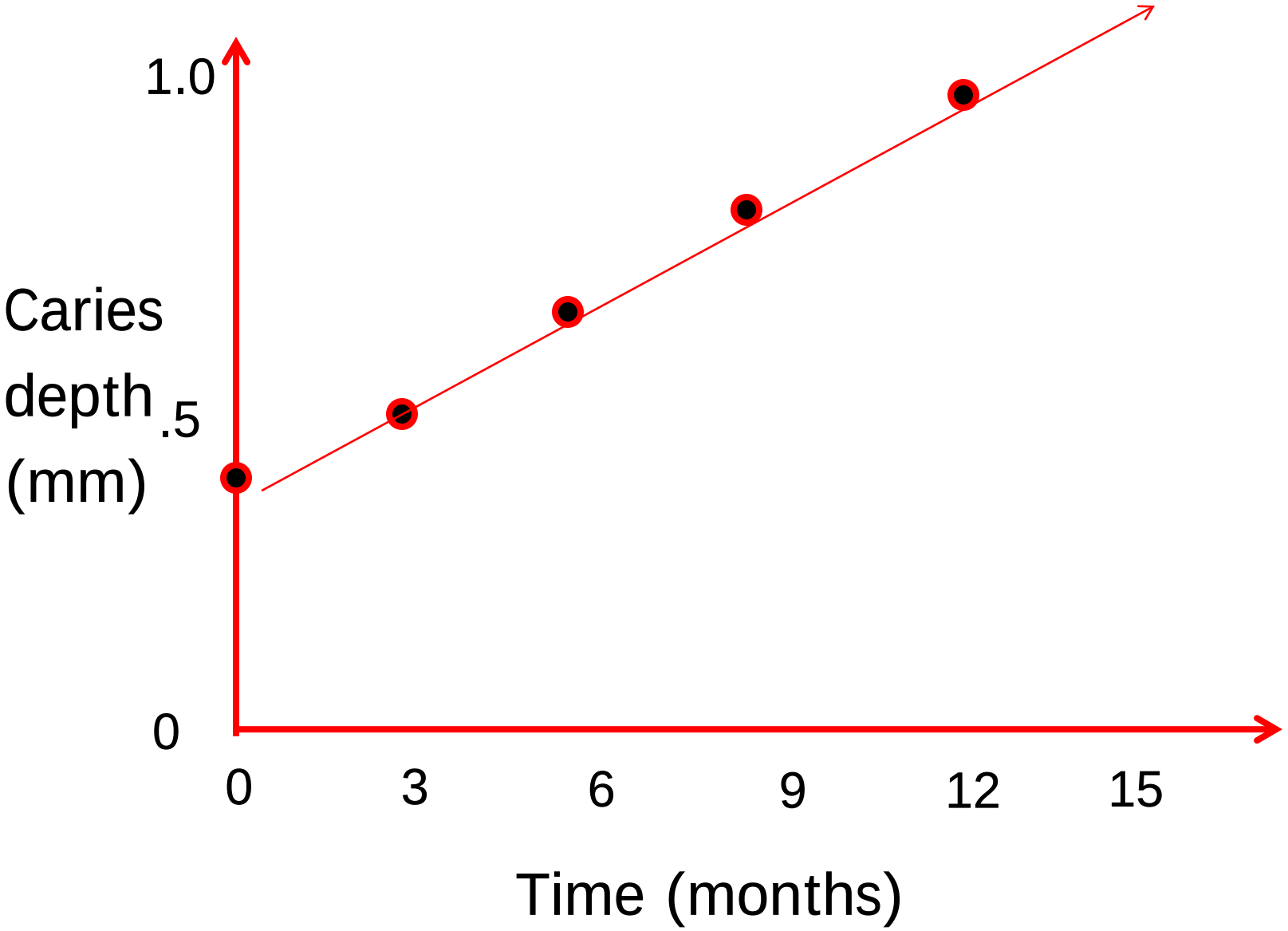


Patient does not return to office because therapy worthless

What happens in the absence of active treatment for caries?

For periodontal disease?

For malocclusions in adults?


1.0
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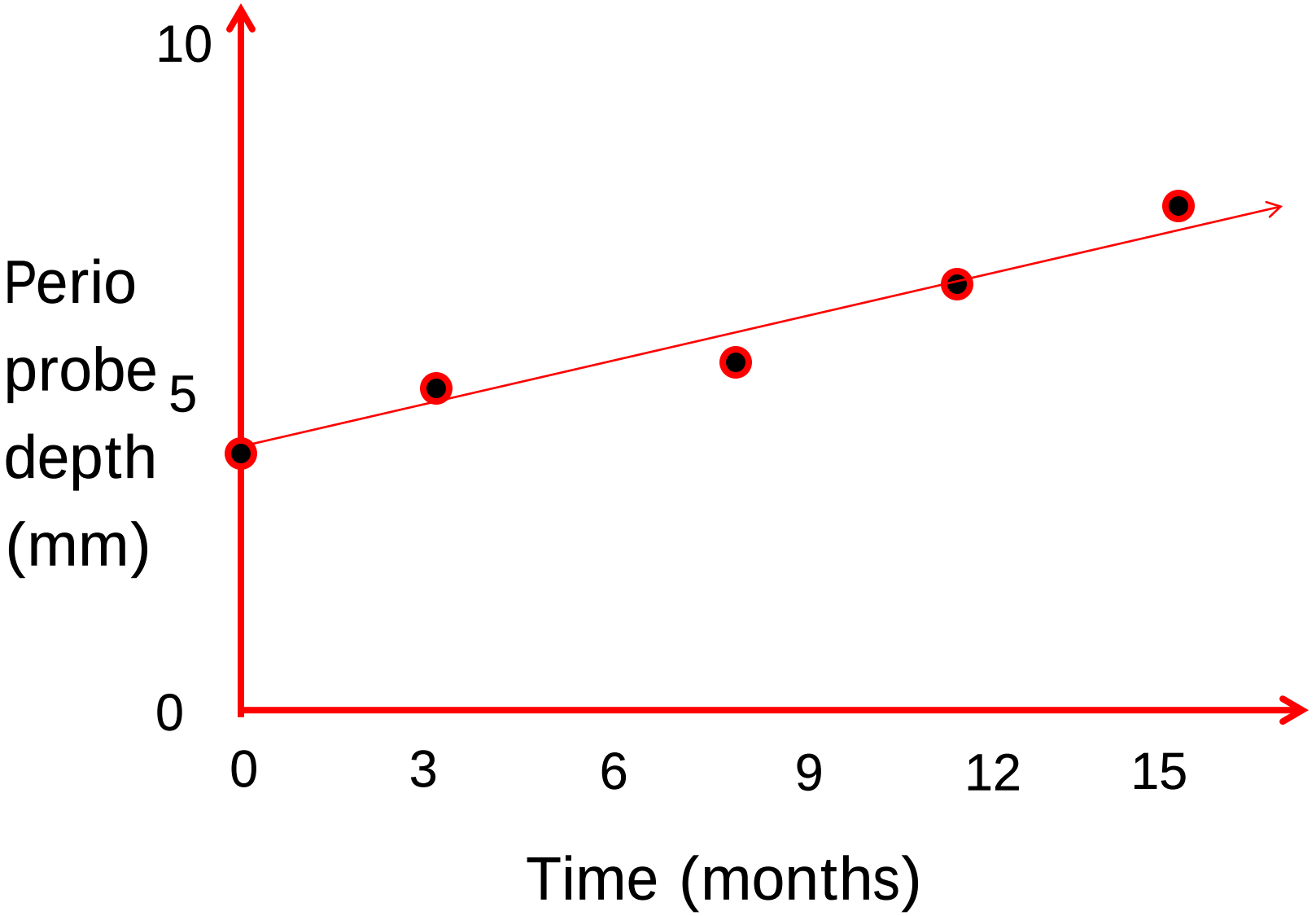
Time (months)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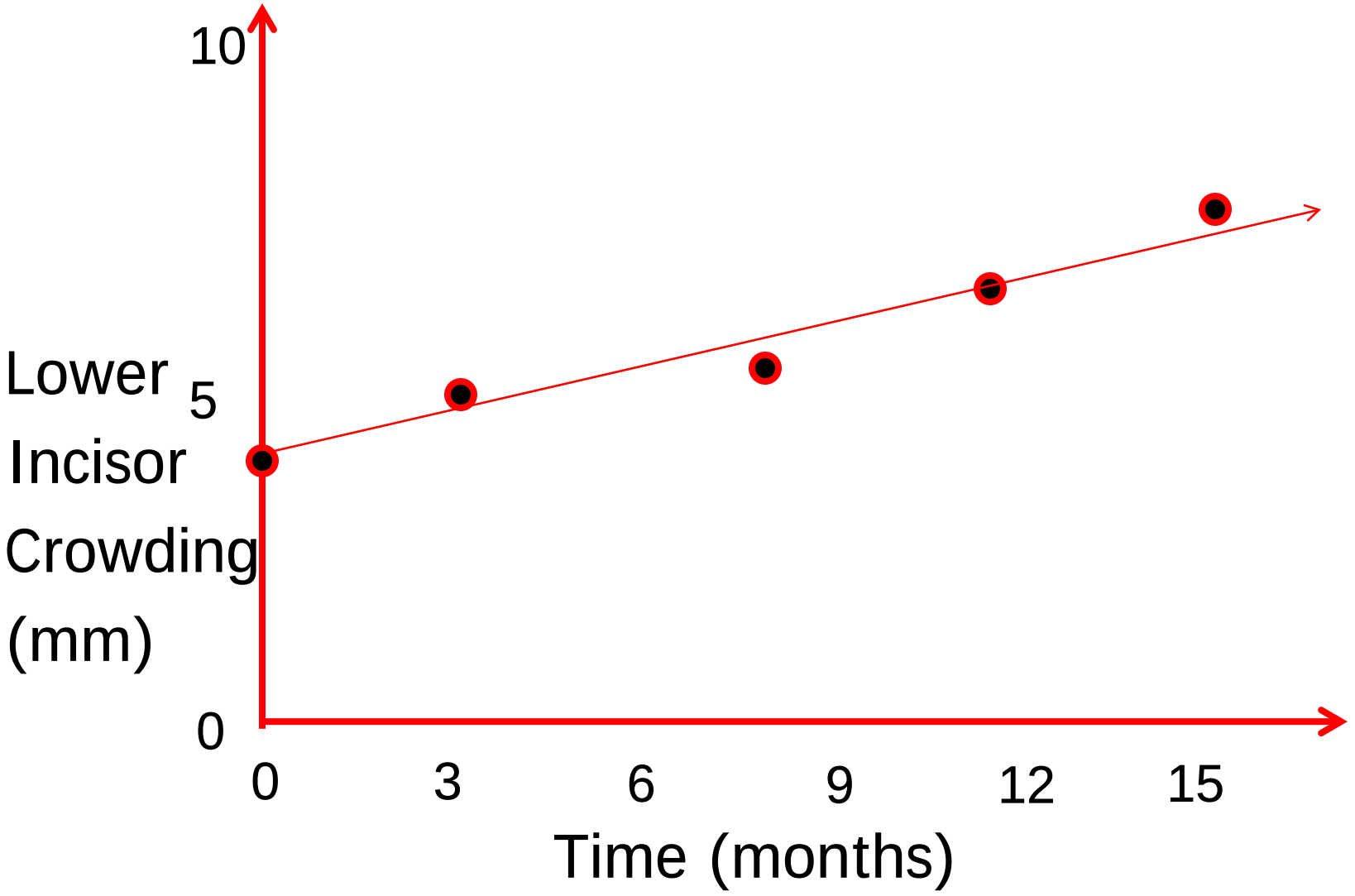
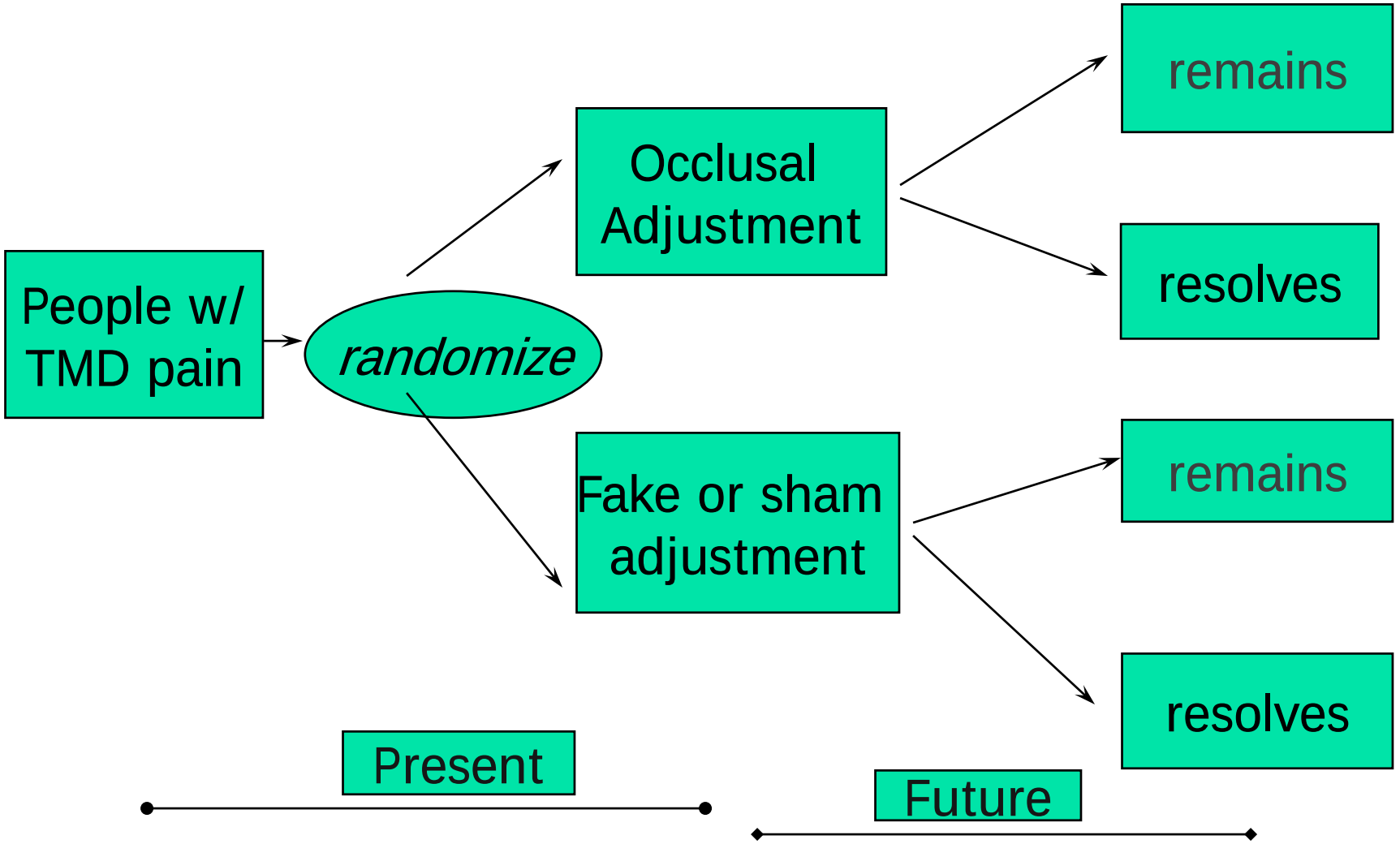
Time (months)

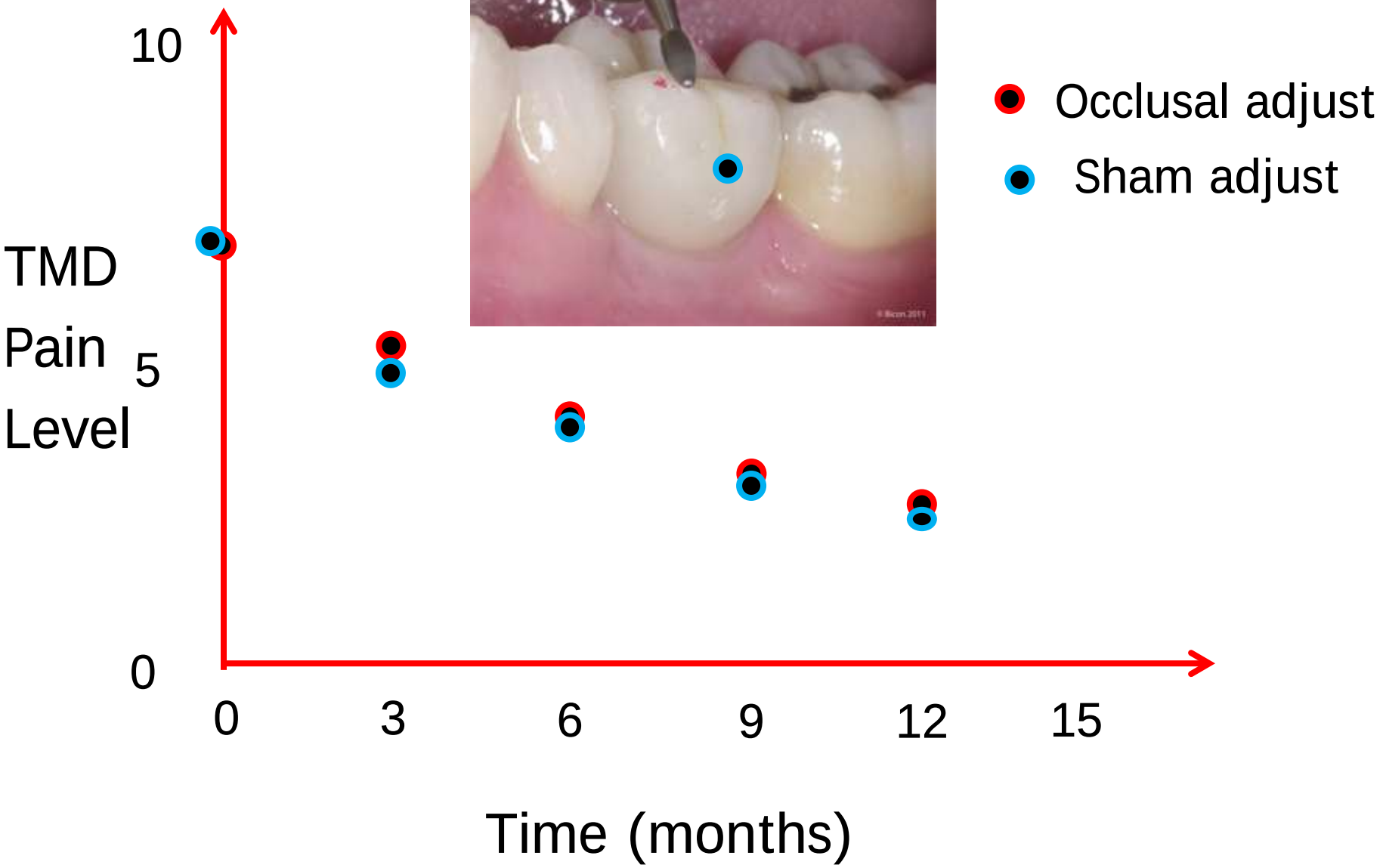


Most conditions dentists treat grow worse without active treatment

What do some randomized trials of TMD treatment show?

Randomized Controlled Trial of Occlusal Adjustment





No specific effect from occlusal adjustment

Occlusal adjustment for treating and preventing temporomandibular joint disorders

Withdrawn | Review | Intervention

Holy Koh, Peter G Robinson

First published: 4 January 2016

Editorial Group: Cochrane Oral Health Group

Main results

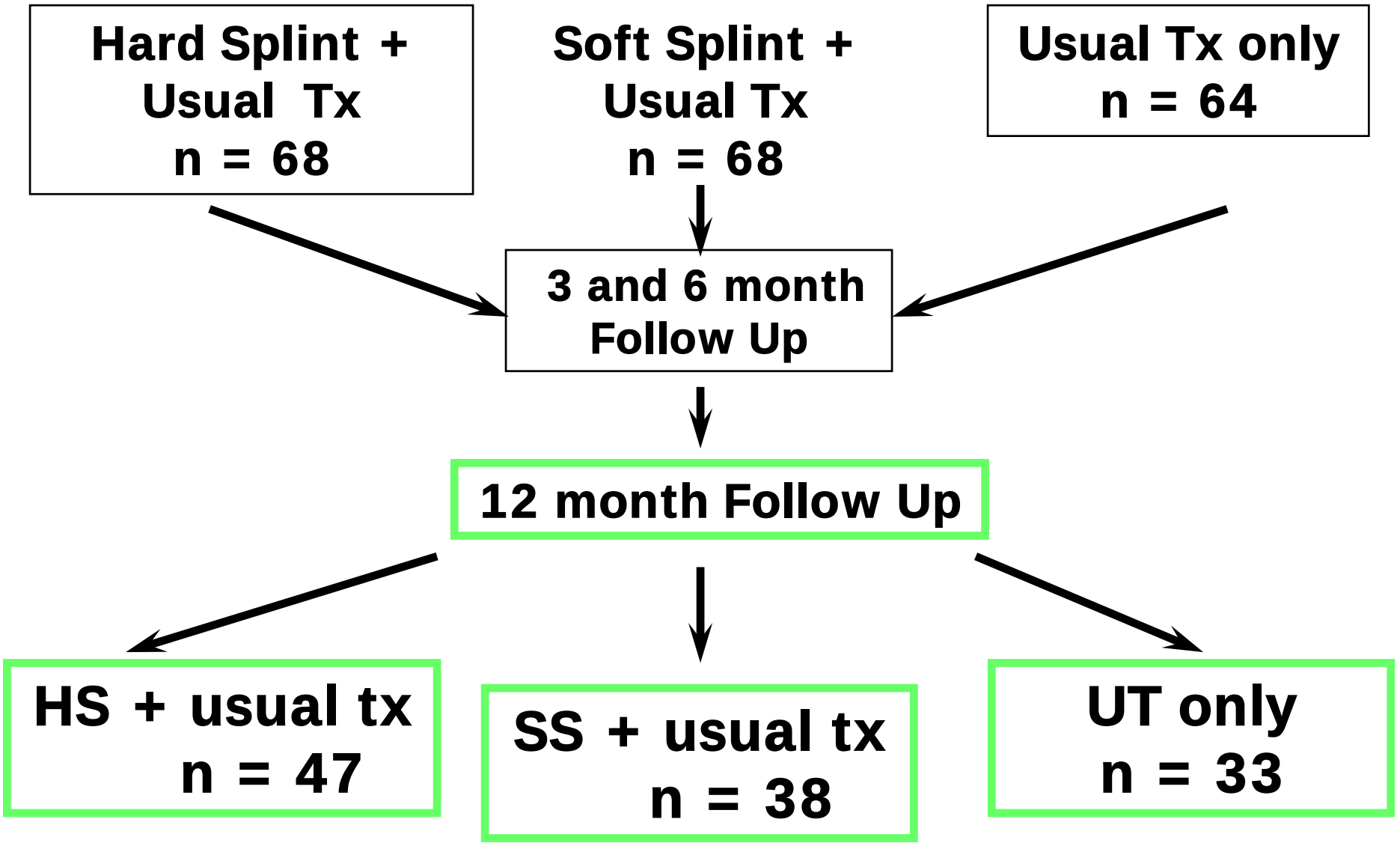
Over 660 trials were identified by the initial search. Six of these trials, which reported results from a total of 392 patients, were suitable for inclusion in the review. From the data provided in the published reports, symptom-based outcomes were extracted from trials on treatment. Data on incidence of symptoms were extracted from trials on prevention. Neither showed any difference between occlusal adjustment and control groups.

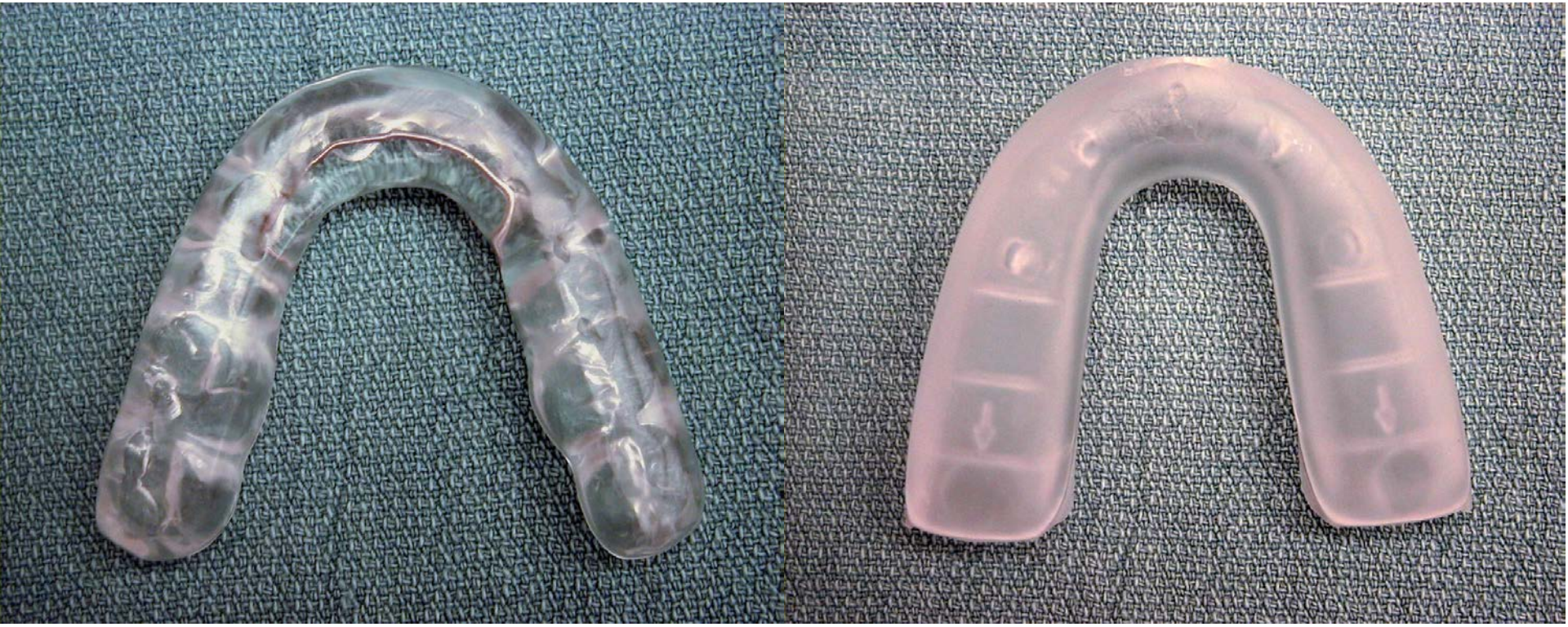
Authors' conclusions

There is an absence of evidence, from RCTs, that occlusal adjustment treats or prevents TMD. Occlusal adjustment cannot be recommended for the management or prevention of TMD. Future trials should use standardised diagnostic criteria and outcome measures when evaluating TMD.

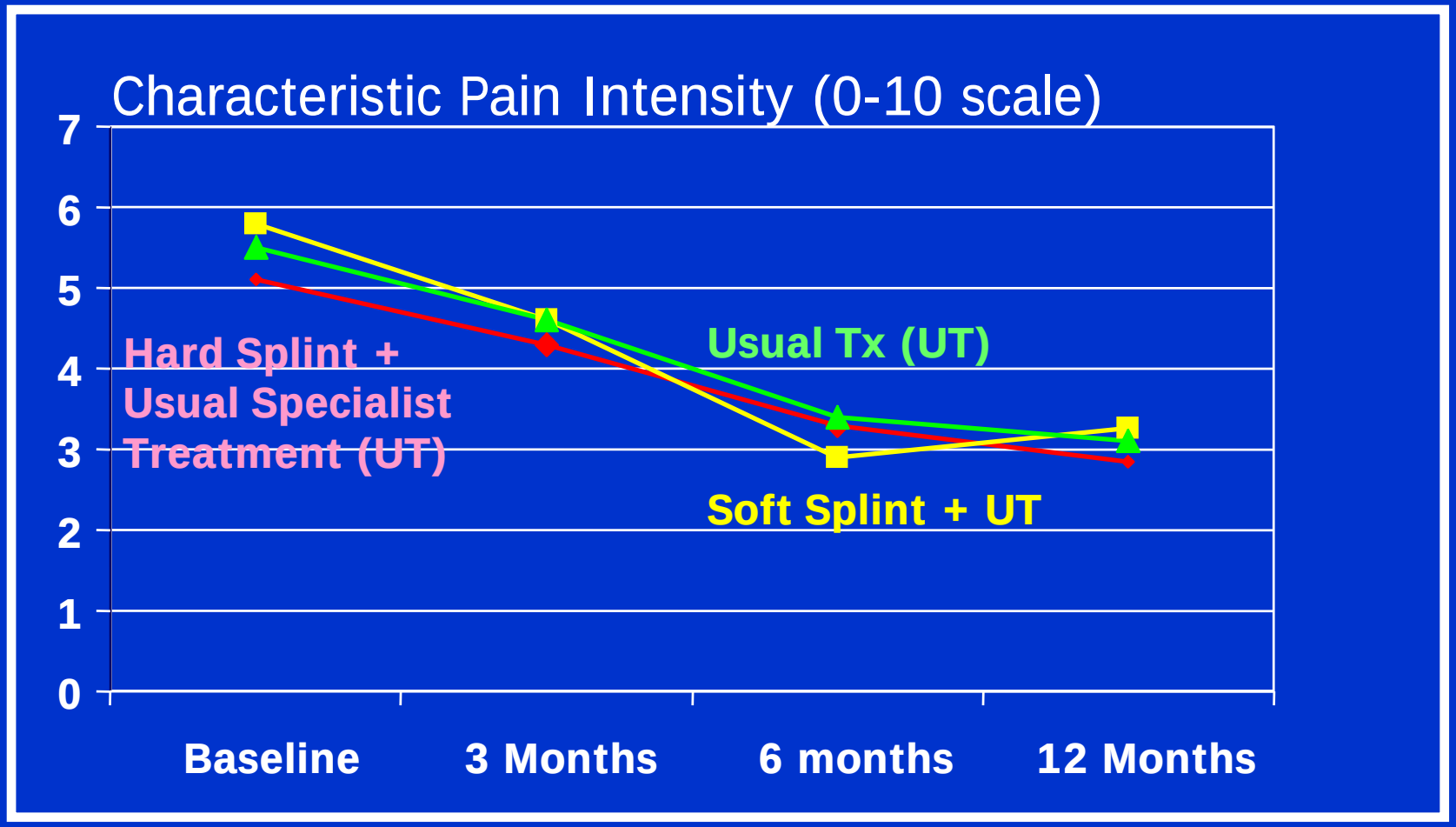
Three examples of individual TMD treatment RCT's

Splint Randomized Controlled Trial n=200



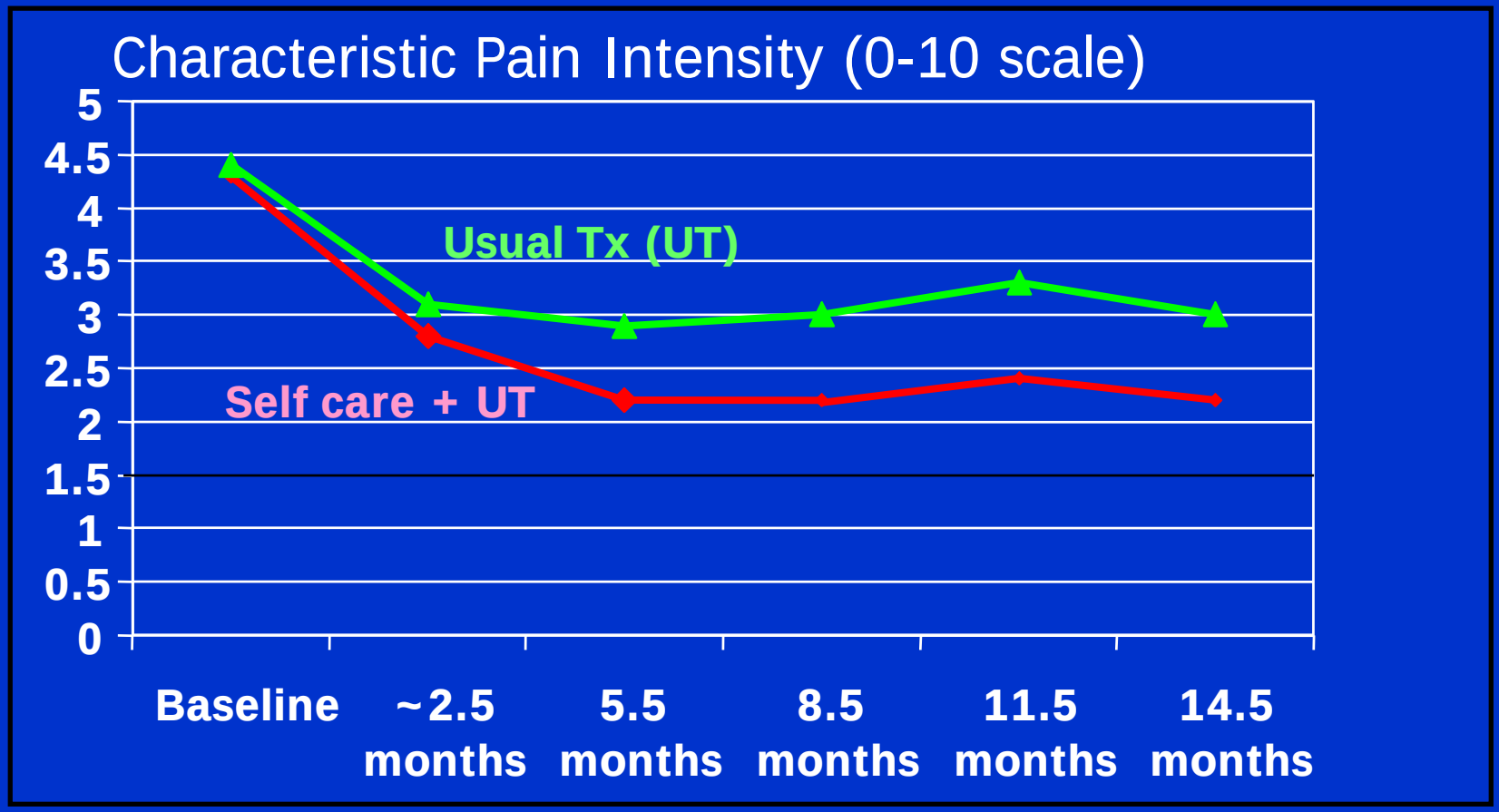


Pain Intensity Over Time: Randomized Trial of Occlusal appliances



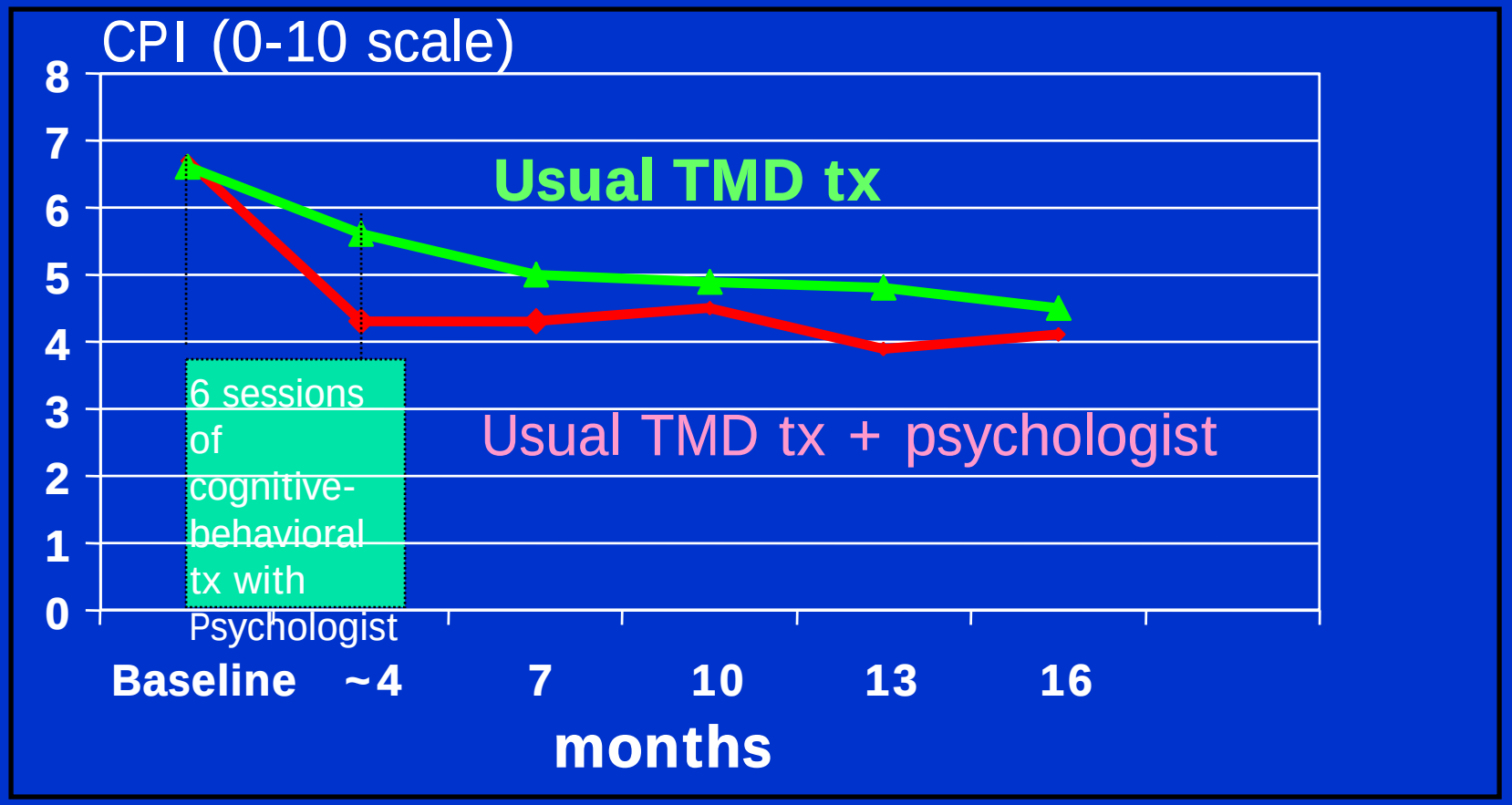
Truelove, et al JADA 2006

Pain Intensity Over Time: Randomized Trial of Self-care with Dental Hygienists



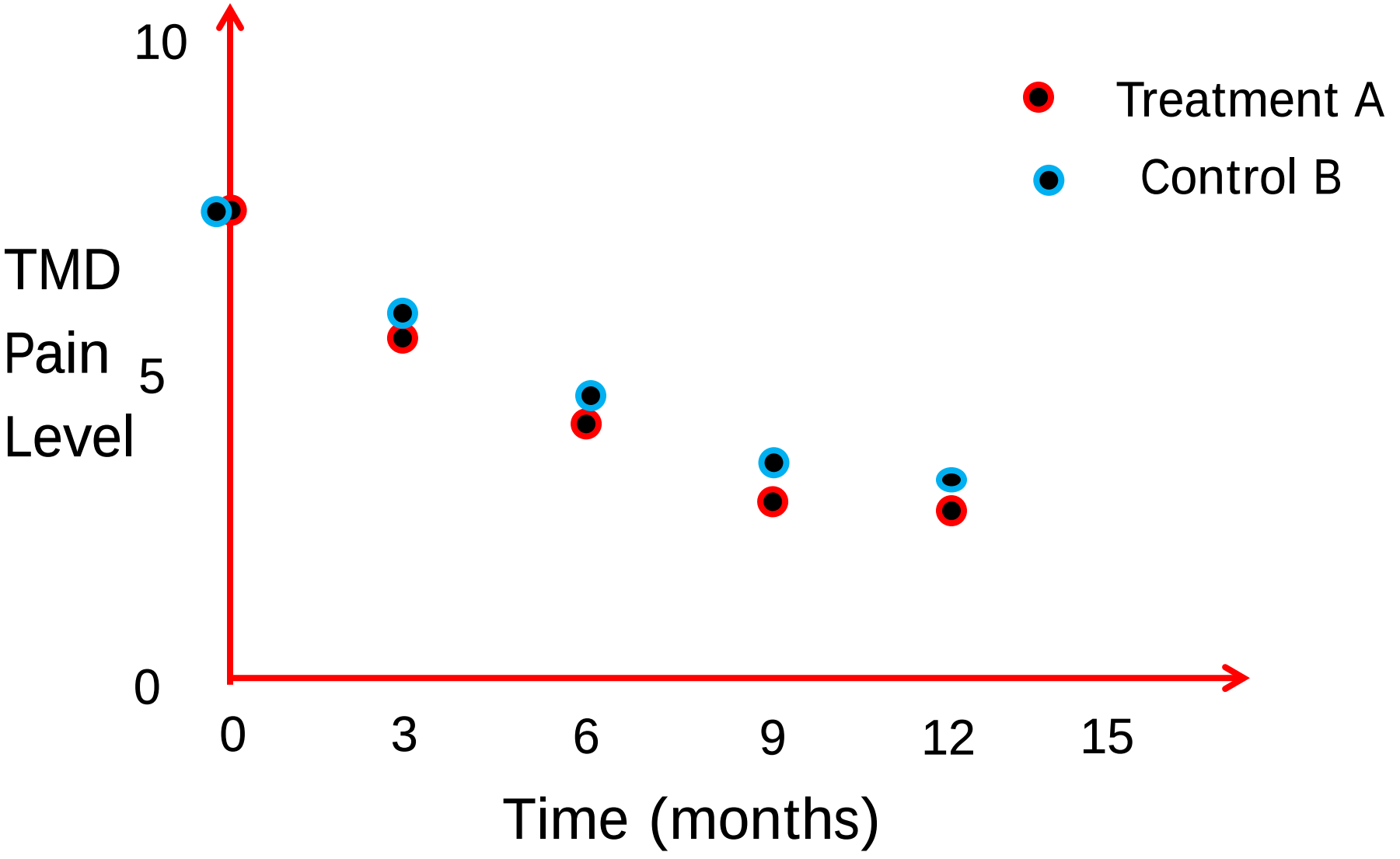
Dworkin et al, 1999

Pain intensity over time: randomized trial of psychological treatment*.

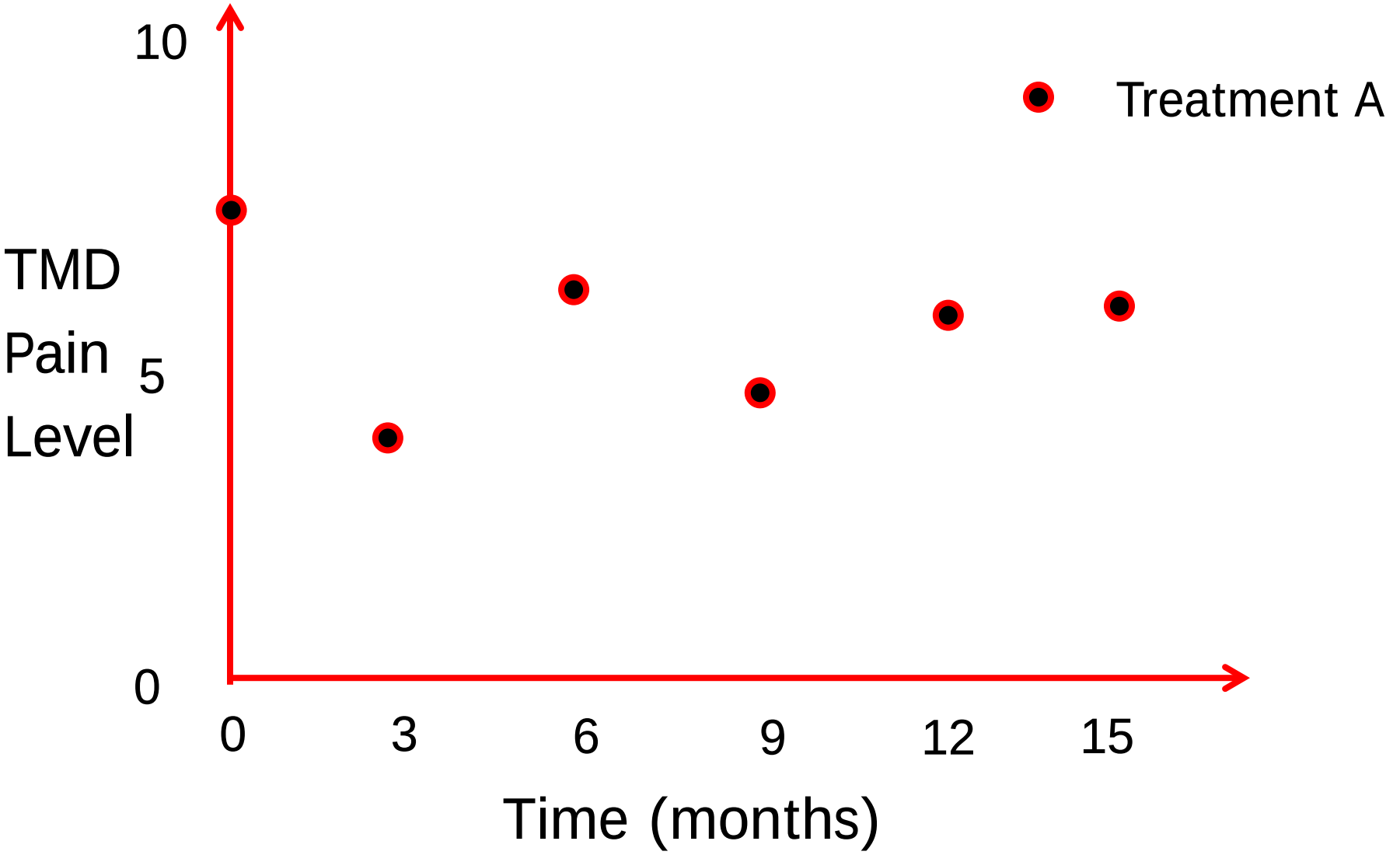


Dworkin et al, 1999

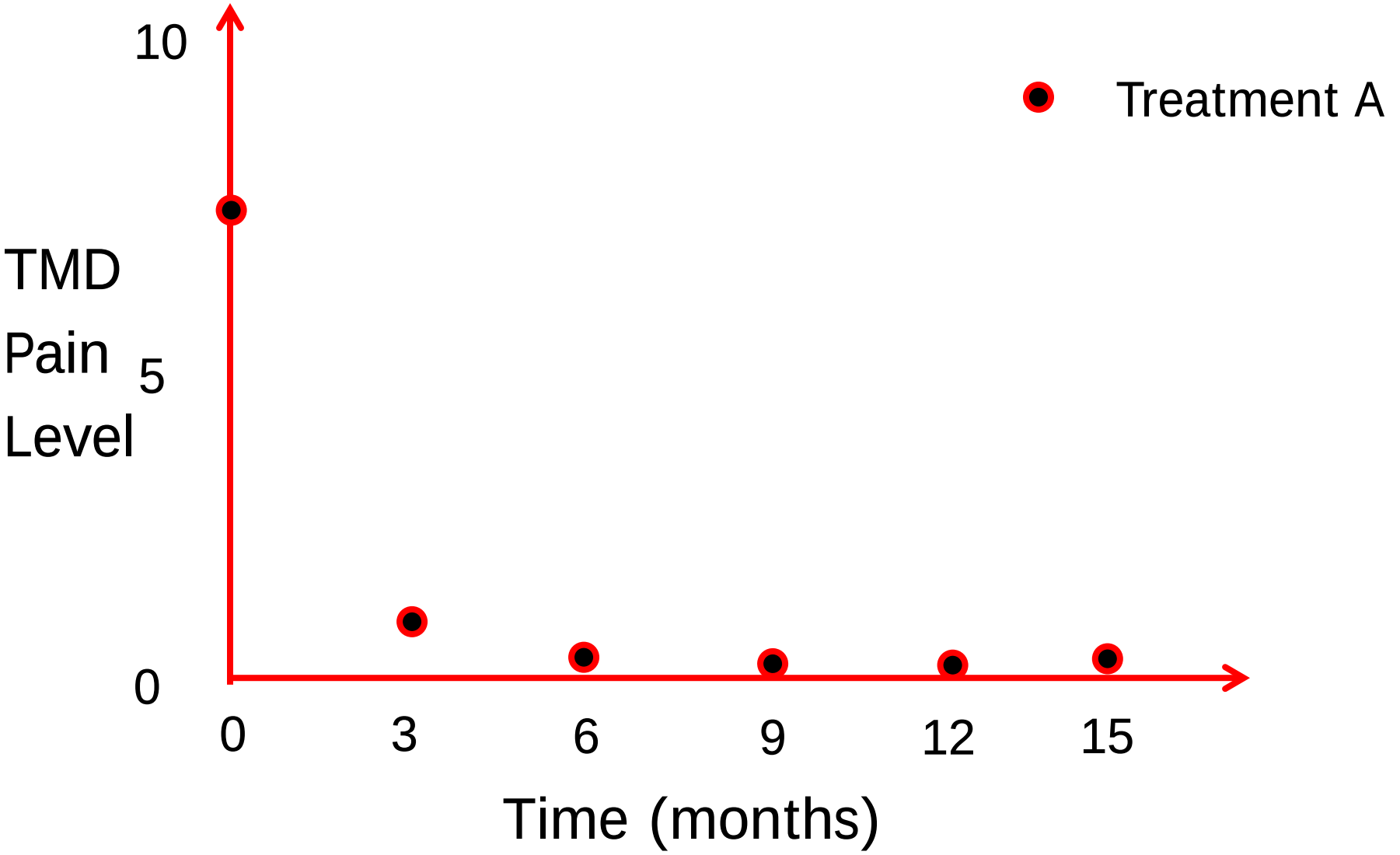
* All have Graded Chronic Pain > 2



Both groups commonly improve on average

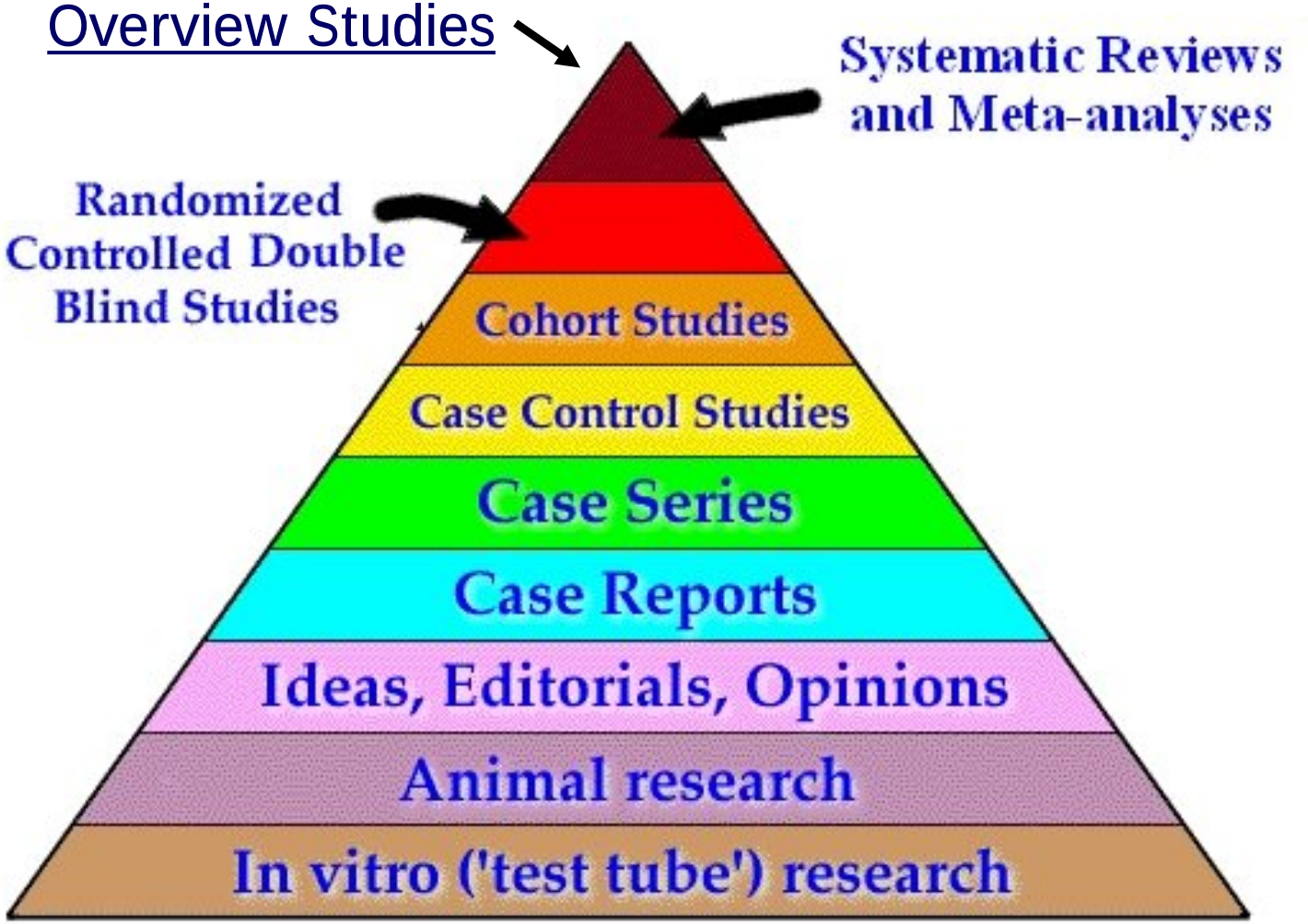


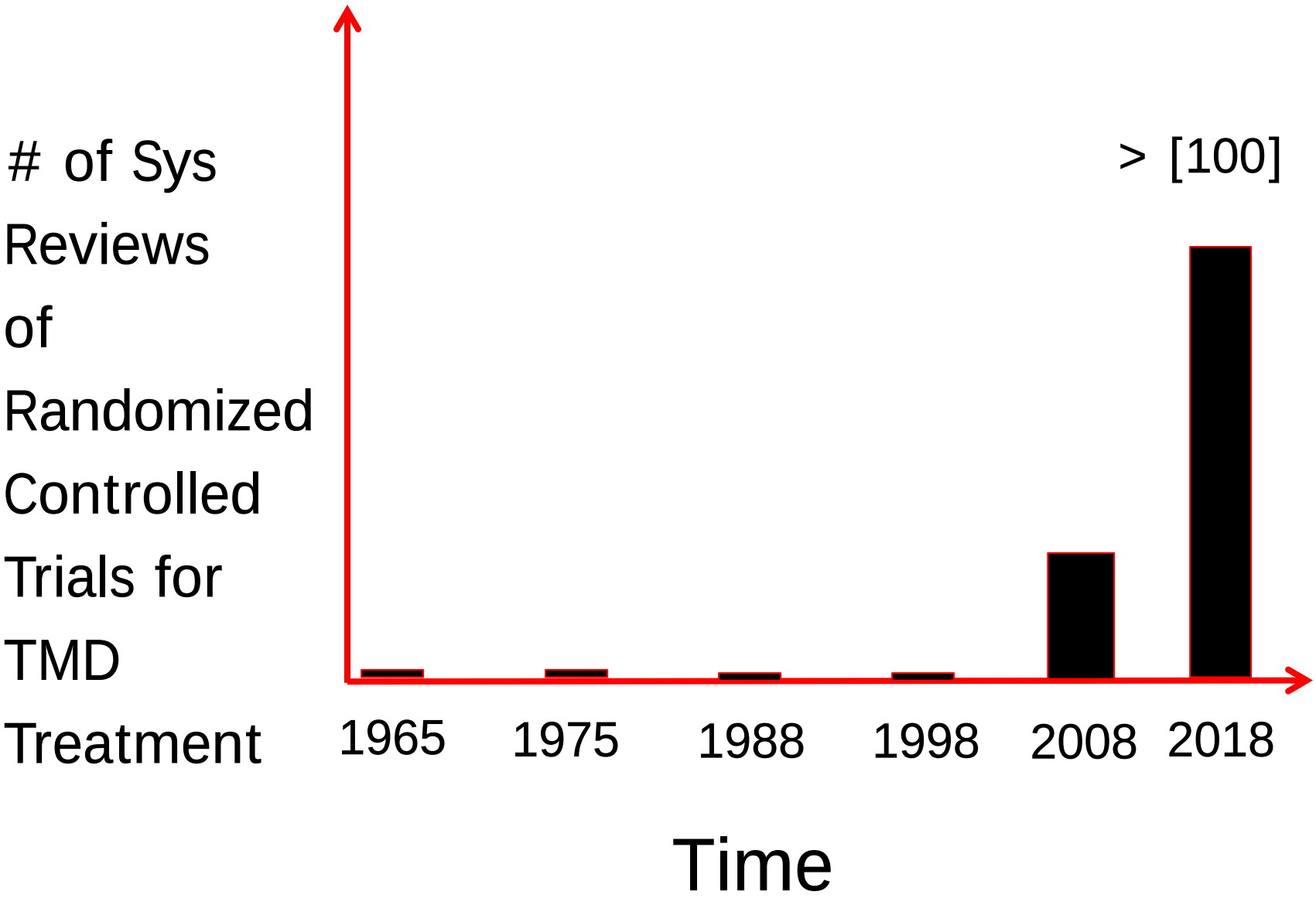
TMD pain oscillates or persists after treatment



TMD pain resolves in ~50% of patients

Top of the Evidence Pyramid: Systematic Reviews

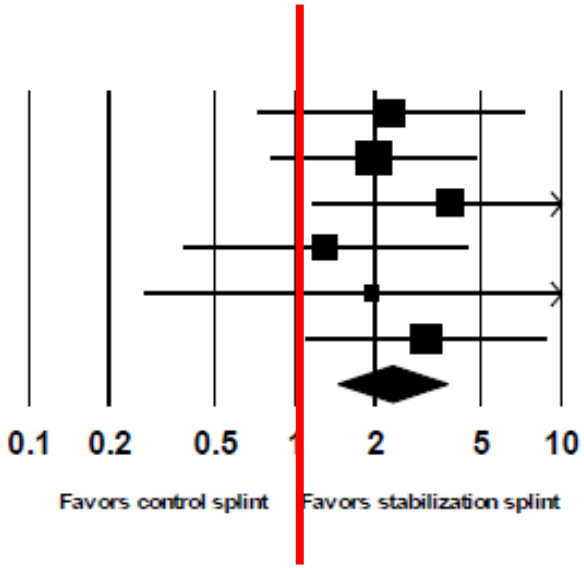



# of Sys Reviews of Randomized Controlled Trials for TMD Treatment
> [100]
1965
1975
1988
1998
2008
2018
Time

Systematic Review Forest Plot: Stabilization Splint vs Control

Individual RCT and overall estimated effect

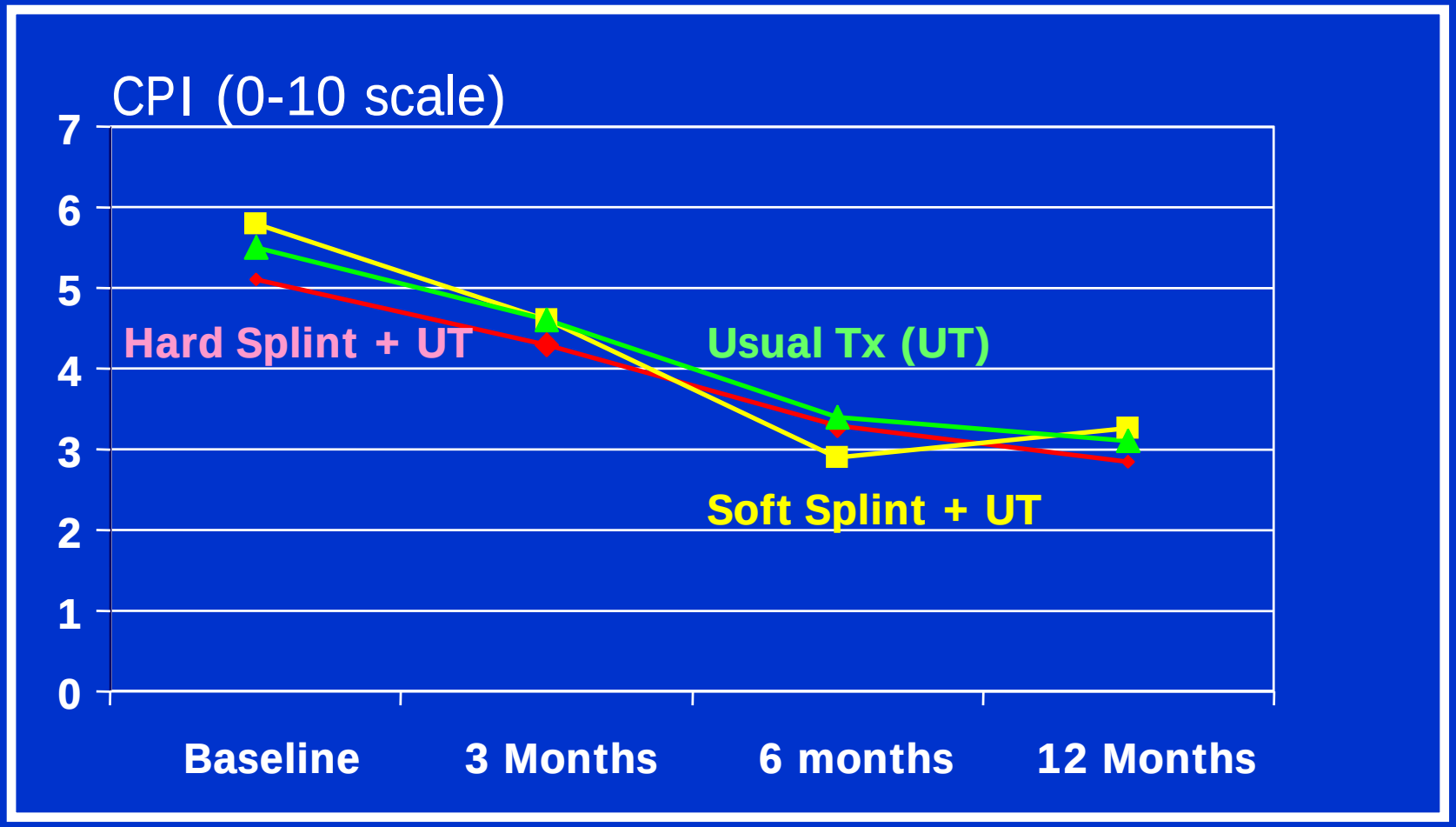
Study name	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value
Ekberg et al 1998 and 1999	2.316	0.724	7.407	1.416	0.157
Raphael et al 2001	1.984	0.803	4.898	1.485	0.137
Ekberg et al 2003	3.824	1.150	12.713	2.188	0.029
Dao et al 1994	1.300	0.377	4.485	0.415	0.678
Rubinoff et al, 1987	1.950	0.272	13.983	0.664	0.506
Wassell et al. 2004	3.122	1.094	8.912	2.128	0.033
	2.320	1.446	3.723	3.490	0.000



Fricton et al

Two times more likely to have TMD pain reduction with splint vs control

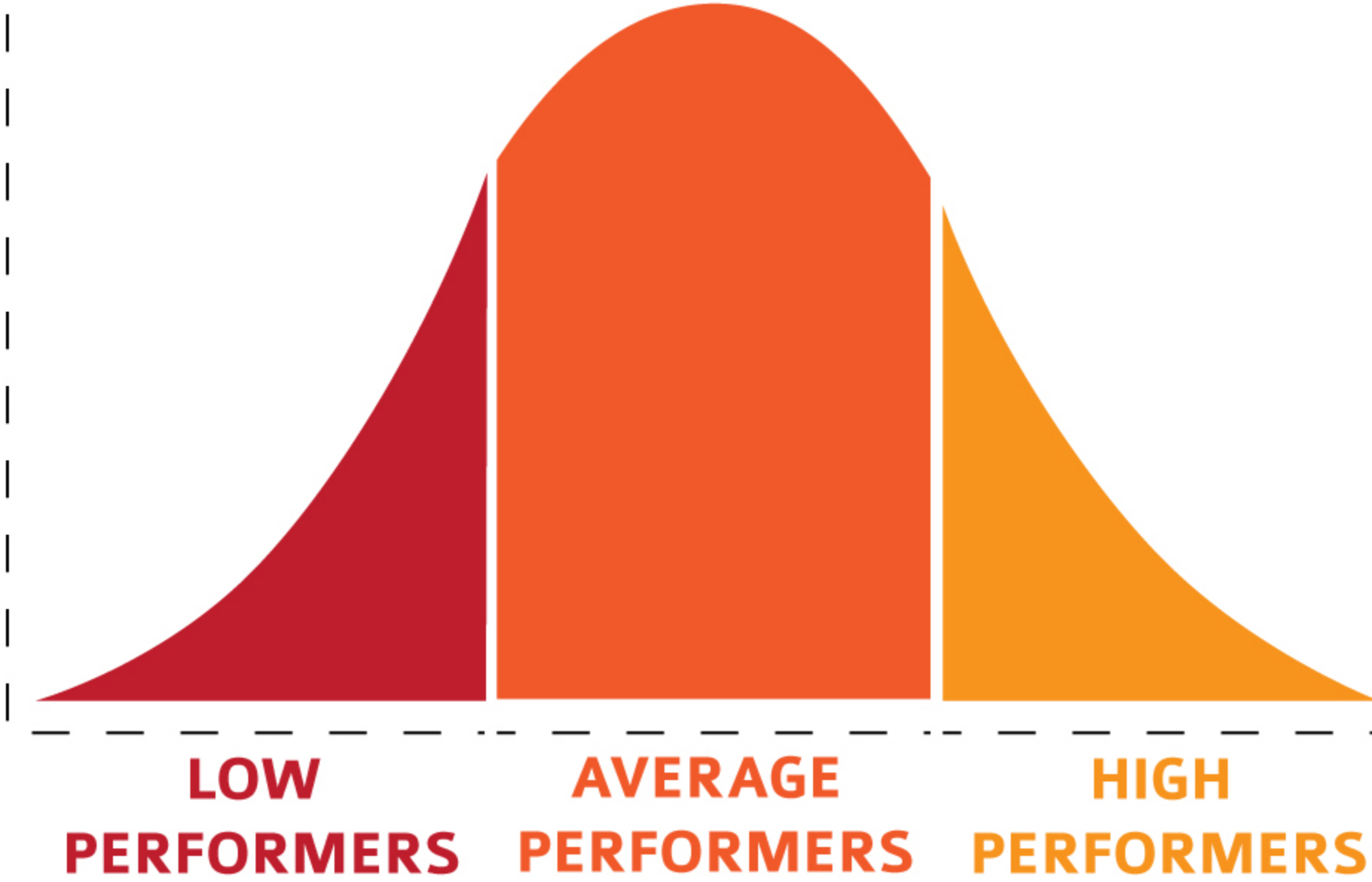
Pain intensity over time: Randomized trial of Occlusal appliances



Truelove, et al JADA 2006

All of these trials show the AVERAGE patient. What about individuals or subgroups?

Response to Occlusal Appliance



Highly variable treatment response to occlusal appliances

- Small group of patients with great *decrease* in pain report and symptoms/impact
- Small group with substantially *increased* pain report and symptoms/impact
- Most with small pain reductions or no change at all

How to predict? Not easy but some promising methods available

TMD Therapies - Questions to Address:

1. **Overview of the range of current treatments for TMD.**

Range of TMD treatments evaluated with RCT

- Occlusal appliances
- NSAID medications
- Muscle relaxant medications
- Behavioral/Self-management/psychologic
- Acupuncture
- SSRI, TCA medications (anti-depressant)
- Neurotoxin injection (Botox)
- Anesthetic/Dry needling into jaw muscle

Range of TMD treatments evaluated with RCT – page 2

- Low level laser therapy
- Occlusal adjustment
- Orthodontics/Orthognathic surgery
- TMJ arthrocentesis/arthroscopy
- Injection of corticosteroids into the TMJ
- PRP injection in/around TMJ
- Physical Medicine
- Others

TMD Therapies - Questions to Address:

1. Overview of the range of current treatments for TMD.
2. **Strengths and limitations of the evidence for each of the major types of treatments**.

1.Systematic Reviews of Behavioral Medicine

- Information, reassurance
- Self-care
- Relaxation
- Cognitive-Behavioral Therapy
- Many other variations

These RCT's show small to moderate reductions in pain intensity and pain impact with no/minimal side effects

2.Systematic Reviews of Occlusal Devices

- Maxillary, mandibular, partial coverage, full coverage, thin, thick, many designs

These RCT's show small to moderate reductions in pain intensity and pain impact with side effects likely not reported

3. Systematic Reviews of Medications

- NSAIDS
- Muscle relaxants
- TCA/SSRI

These RCT's show small to moderate reductions in pain intensity with likely side effects not reported

4. Systematic Reviews of Injections Techniques

- Local anesthetic into muscle
- Dry needling into muscle
- Neurotoxin into muscle

These RCT's show small to moderate reductions in pain intensity with likely side effects reported/unreported

5. Systematic Reviews of Occlusal Adjustment, Dental Treatment, Orthodontics/Orthognathic Therapy

- Few studies, but of those RCT done, minimal to no effect compared to other therapies.

These RCT's show NO reductions in pain intensity with known side effects

Strength: Number of Randomized Controlled Trials, and Systematic Reviews of TMD RCT Treatments has Greatly Increased in the Past 15 years

Limitation: Most TMD RCT's use outcomes that do not measure what really matters to patients – quality of life, pain interference

Limitation: Quality of TMD Systematic Reviews Poor

- Vast majority of TMD systematic reviews reach the same conclusion:
  - Not enough high quality studies available
  - Of studies included, sample sizes are small
  - Of studies included, quality scores are low
  - Conclusions of treatment effect are usually equivocal

Limitation: TMD case definitions not comprehensive

- TMD case classification is usually simplistic and uni-dimensional. DC for TMD is not enough. Correlates of neural mechanism should be considered – acute, subacute, chronic.

Limitations: comorbidities not detected, measured

- LOCAL
  - Dental pain, headache, migraine
- REGIONAL
  - Headache, neck, upper back pain
- SYSTEMIC
  - Sleep disturbance
  - Widespread pain
  - Irritable bowel
  - Other overlapping pain conditions

Limitation: Treatment safety

- Treatment safety is rarely addressed in systematic reviews but is a critical aspect to insure that no harm is done to patients in pain.

Clinical observation: TMD therapies chosen unrelated to specific diagnoses present

- Most initial and subsequent therapies are chosen based on the *preferences* of the practitioner.
- Recommend: A comprehensive paradigm is needed that addresses all relevant specific diagnoses, comorbidities and pain mechanisms with specific proven management.

Clinical observation: Misdiagnosis in Orofacial Pain and TMD management is Common

TMD Therapies - Questions to Address:

1. Overview of the range of current treatments for TMD.
2. Strengths and limitations of the evidence for each of the major types of treatments.
3. Where is the evidence lacking?
4. **What are recommendations and priorities for research to strengthen the evidence base.**

TMD Treatment Trials Today: What to do?

STOP!

STOP

Take a Breath

Observe

Proceed (with new trial recommendations)

Specific Recommendations

- Create Overview studies (Systematic review of the systematic reviews) on various therapeutic agents.
- Analyze methodological shortcomings of current and previous RCT's and SRs.
- Make specific recommendations (ala CONSORT or IMMPACT) of conduct and reporting guidelines for RCT/SR.

Specific Recommendations

- Develop simple diagnostic chairside measures to aid in precision medicine application
- Create evidence-based treatment guidelines for the new, expanded description of patient groups with TMD
- Measure adherence to these guidelines in the community along with population health outcomes

Thank You

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Simple Tools To Help Identify Subgroups

- DC TMD Pain Diagram - Mannekin
- PEG SCALE - Pain intensity and Impact

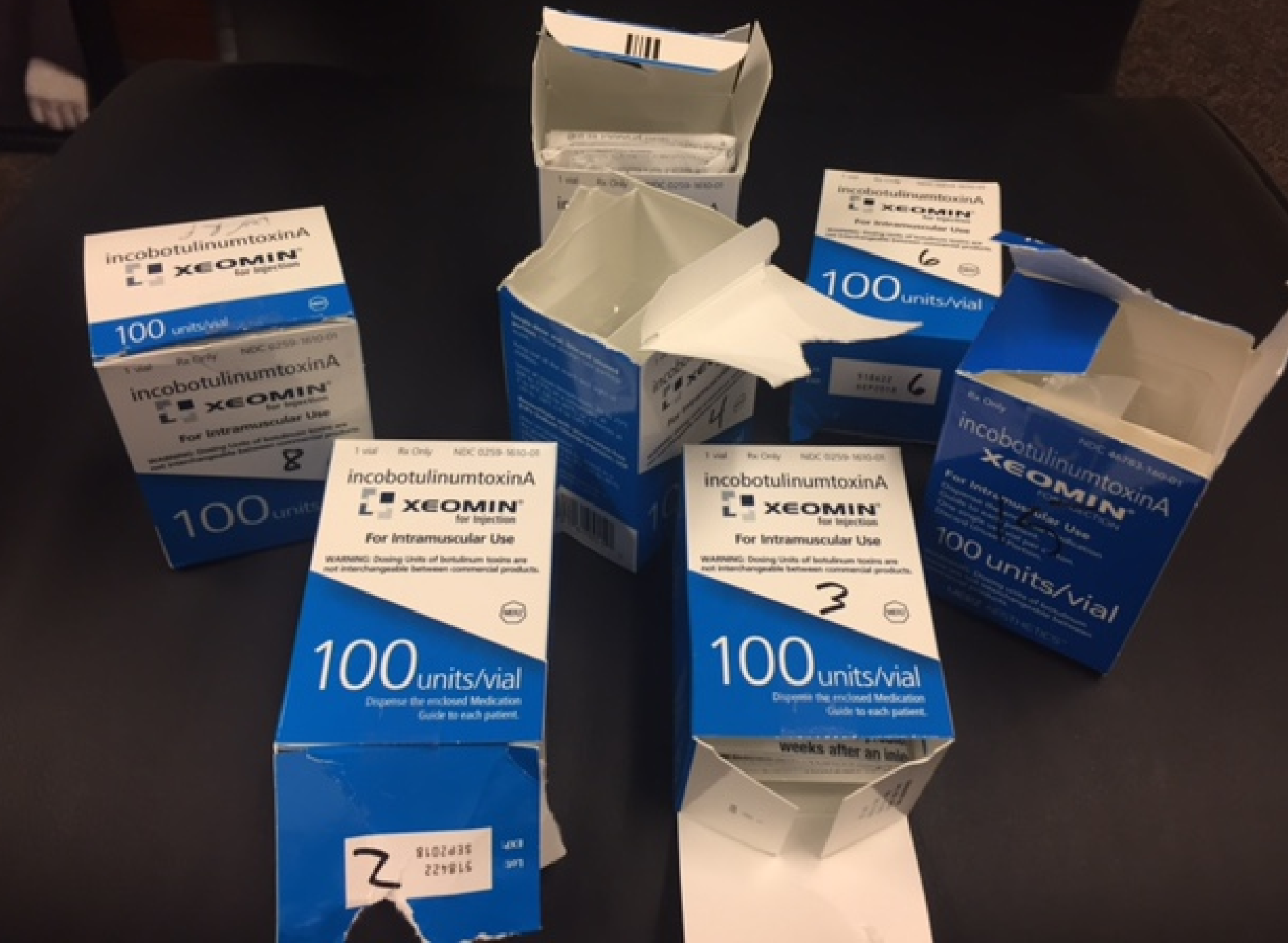
Tools to perform rational single subject trials in the clinic

- Approach is to measure relevant clinical measures at baseline
- Identify all clinical conditons
- Logical, evidence-based therapies

Extra slides

TMD Therapies - Questions to Address:

1. Overview of the range of current treatments for TMD.
2. Strengths and limitations of the evidence for each of the major types of treatments.
3. Where is the evidence lacking?
4. What are recommendations and priorities for research to strengthen the evidence base.


incobotulinumtoxinA
XEOMIN
For Intramuscular Use
100 units/vial
Dispense the enclosed Medication Guide to each patient.

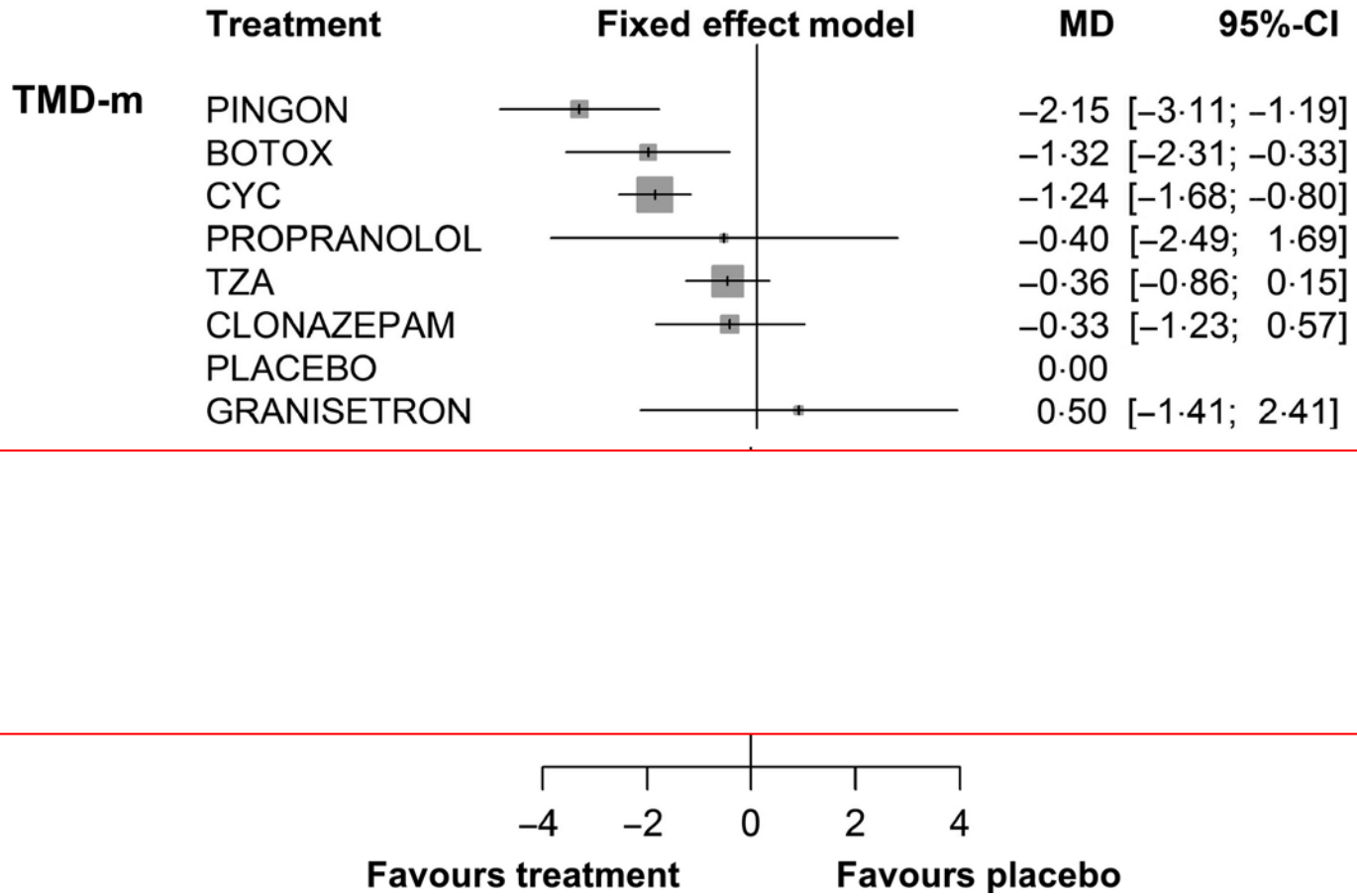
TMD Treatment Challenges

- Iatrogenic TMD disease
  - Malocclusion from splints
  - Neuropathic pain from:
    - implants
    - TMJ surgery
- Misdiagnosis
  - Acute vs. chronic pain differences not appreciated
  - Subtype that responds to splint? Other modalities?
  - Need targeted treatment

BOTOX??

10th line treatment at UW at this time

Many other better therapies to use first



Journal of Oral Rehabilitation, Volume: 44, Issue: 10, Pages: 800-826, First published: 27 June 2017, DOI: (10.1111/joor.12539)

Common, First Line Treatment for Acute TMD Myalgia and Arthralgia

- Reassure patient – typical course is one of improvement – no surgery needed.
- Check if they are clenching their teeth during the day.
- Jaw stretching/ hot packs
- Consider soft mouth guard if bruxism is present
- Reevaluate in 3 to 4 weeks

Common, Second visit Treatment for acute TMD myalgia and arthralgia

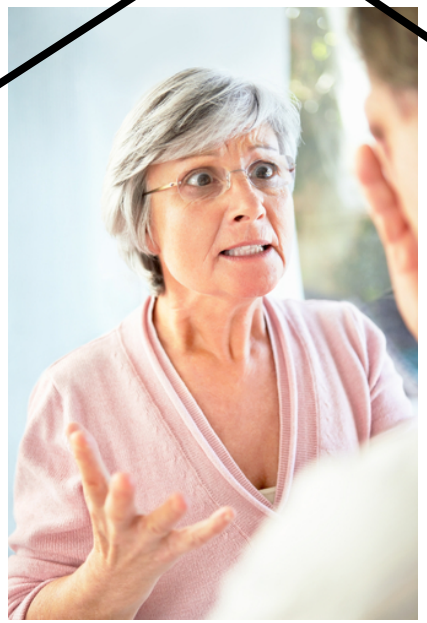
- Reevaluate with History and Physical
- If improved, keep doing conservative therapy
- If not, consider medications:
  - Piroxicam 10 mg after breakfast (NSAID)
  - Tizanidine 2 mg HS or Cyclobenzaprine 5 mg HS
- If Bruxism is present & no help with soft guard, fabricate maxillary flat plane occlusal appliance

- Q: What is the first thing that you do with someone in pain after your history and physical, diagnostic tests?
  - 1. Tell them what is wrong and what you want to do
  - 2. Start NSAIDS and muscle relaxants
  - 3. Reassure them that the problem is not serious, and they will almost certainly get better and recover
  - 4. Start with conservative self-care treatment

NOT:

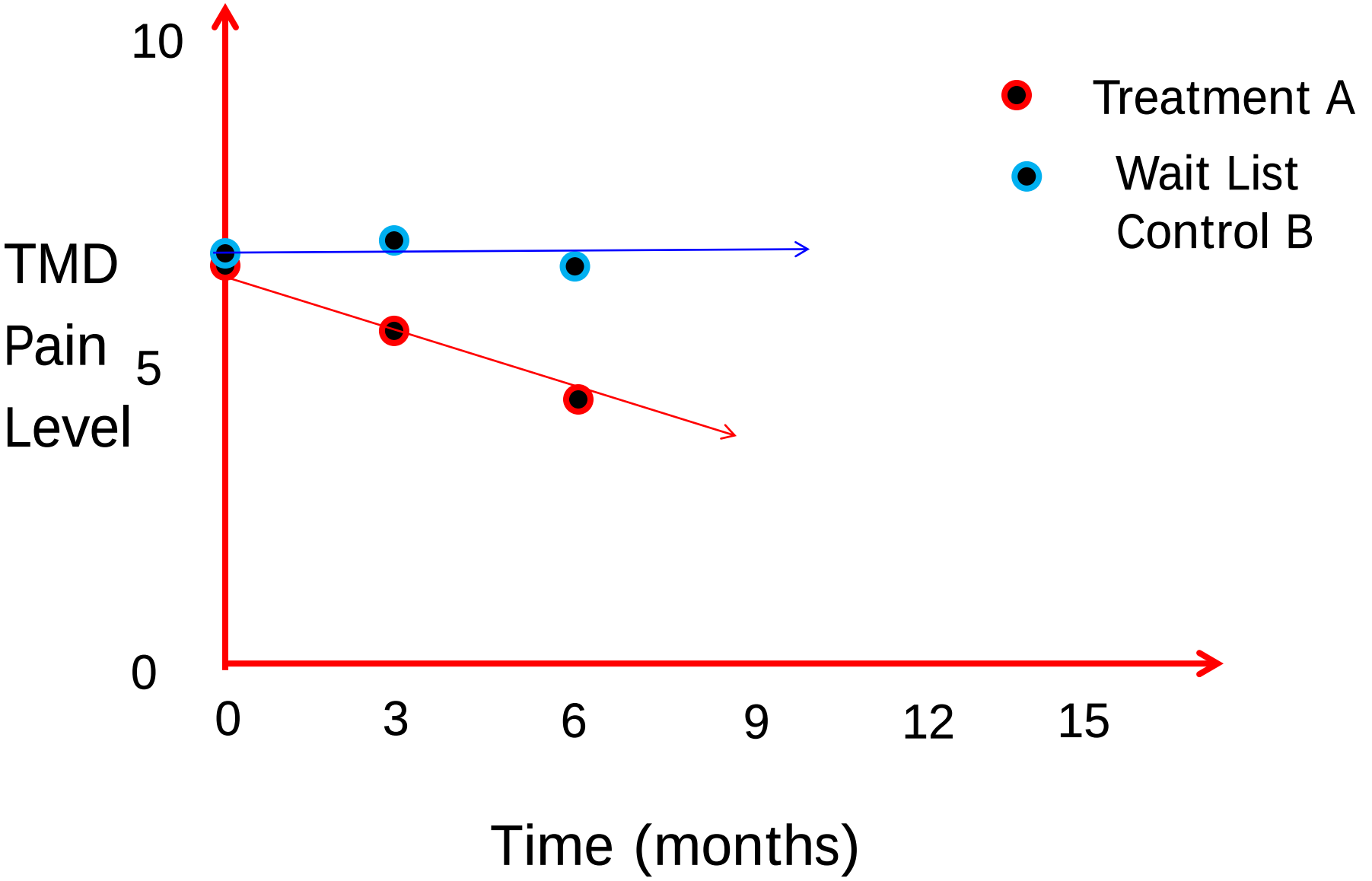
“You have Chronic Pain”

“Nothing can be done”



Evidence-based TMD therapy?

- In 1983, President's commission on TMD treatment recommended "conservative, reversible treatment" vs. surgical or irreversible treatment
- Little evidence (other than case reports and case-series) were available about what treatment was better than another
- Recommendations were based on concern for safety, best guesses



Wait list controls are exception – they generally do not improve

Evidence-based TMD therapy !

- Now, in 2018, over [600] randomized controlled trials for TMD therapies have been performed.
- The overwhelming results of these studies, performed around the world, show evidence to provide reversible, conservative treatment that is *almost entirely non-surgical*.
- This talk and our UW OM approach is built on these science-based concepts and therapies

Some TMD cases...

ID: 18 year old female student
CC: bilateral jaw pain x 2 months

- HPI: pt was fine until she became stressed at heavy school workload and participating in school play, and started noticing jaw pain and clicking.
- Pain worse in the am, can't open as wide, Tylenol doesn't help
- Pain now: 8/10
- Pain worst: 9/10
- Pain average: 6/10

ID: 18 year old female student
CC: bilateral jaw pain x 2 months

- Days in pain in last 6 months(180)- every day for 60 days – 60
- Hours in pain? 8 hours per day
- Any pain-free time periods? Yes.
- Pain impact = 2/10
- Psychosocial screen = no depression, anxiety
- Other pain conditions = occasional TTHA
- Medical problems = none
- 3rd's extracted 18 months ago

ID: 18 year old female student
CC: bilateral jaw pain x 2 months

- Exam
  - ROM 18/42/45 mm
  - Right superior masseter, right lateral pole of TMJ mild to moderately painful to 2 pounds pressure palpation
  - Occlusion WNL – no pathology
  - Essix retainer shows evidence of occlusal wear on canines
  - PANO – no pathology

ID: 18 year old female student
CC: bilateral jaw pain x 2 months

- Diagnosis – Acute pain
  - Why? Short-lived, non-continuous time quality
  - Pain impact is low
- Other specific TMD diagnoses
  - Right superior masseter myalgia
  - Right TMJ mild arthralgia
  - Left inferior masseter myalgia
  - Likely Sleep bruxism

ID: 18 year old female student
CC: bilateral jaw pain x 2 months

- Management
  - 1. Explain diagnoses and their meaning to patient and her mother
  - 2. Tell them about stepped care therapy, usual prognosis, acute pain, common treatment options
  - 3. Conservative TMD protocol, decrease tooth contact during day, jaw stretching plus hot packs, consider ibuprofen trial
  - 4. Consider hard acrylic maxillary flat plane appliance
  - 5. Consider muscle relaxant trial –cyclobenzaprine 5 mg HS or tizanidine 2mg HS

ID: 18 year old female student
CC: bilateral jaw pain x 2 months

- Follow up visit in 4 weeks -
- Pain level slightly better
  - 1. noticed that she clenches her teeth during the day
  - 2. forgot about jaw stretching
  - 3. ibuprofen trial did not help
  - 4. Fabricate hard acrylic maxillary flat plane appliance
  - 5. Start muscle relaxant trial –tizanidine 2mg HS

Case 2

ID: 48 year old female
CC: bilateral jaw pain x 12 months

- HPI: pt was fine until she became stressed at heavy school workload and participating in school play, and started noticing jaw pain and clicking.
- Pain worse in the am, can't open as wide, Tylenol doesn't help
- Pain now: 8/10
- Pain worst: 9/10
- Pain average: 6/10

ID: 48 year old female
CC: bilateral jaw pain x 12 months

- Days in pain in last 6 months(180)- every day for 180 days – 180
- Hours in pain? 16 hours per day
- Any pain-free time periods? NO.
- Pain impact = 6/10
- Psychosocial screen = depression, anxiety
- Other pain conditions = widespread pain, migraine
- Medical problems = complex

ID: 48 year old female student
CC: bilateral jaw pain x 2 months

- Exam
  - ROM 18/42/45 mm
  - Right superior masseter, right lateral pole of TMJ mild to moderately painful to 2 pounds pressure palpation
  - Occlusion WNL – no pathology
  - Occlusal appliance shows NO evidence of occlusal wear on canines

ID: 48 year old female
CC: bilateral jaw pain x 12 months

- Diagnosis – Chronic pain
  - Why? >6 mo, continuous time quality
  - Pain impact is high
- Other specific TMD diagnoses
  - Right superior masseter myalgia
  - Right TMJ mild arthralgia
  - Left inferior masseter myalgia
  - Depression

ID: 48 year old female
CC: bilateral jaw pain x 12 months

- Management
  - 1. Explain diagnoses and their meaning to patient
  - 2. Tell her about stepped care therapy, usual prognosis, acute/chronic pain, common treatment options
  - 3. Conservative TMD protocol, decrease tooth contact during day, jaw stretching plus hot packs, consider ibuprofen trial
  - 4. No appliance
  - 5. Check with MD about antidepressants and CBT
  - 5. Consider multiple med trials