



# *BACK PAIN: THE BENEFITS OF EXERCISE AND NUTRITION*

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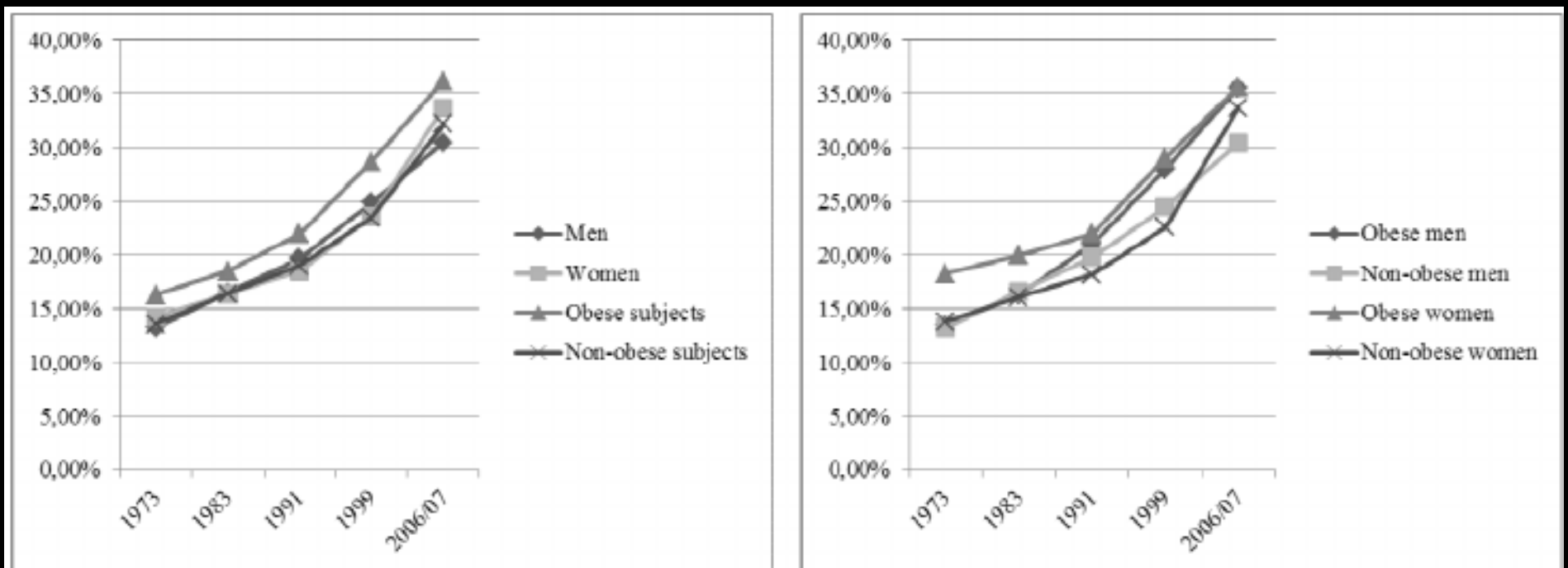
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# LEARNING OBJECTIVES

- Discuss the epidemiology of low back pain
- Review the major cause of low back and how it relates to disability
- Review exercise and its role in the treatment of low back pain
- Review nutrition and evidence for a plant-based diet

# LOW BACK PAIN: *EPIDEMIOLOGY*

- Lifetime prevalence of 80% (Lawrence, Loney)
- One year prevalence up to 56%. (Deyo)
- 24-80% will have recurrence in first year. (Hoy)



## LOW BACK PAIN: *EPIDEMIOLOGY*

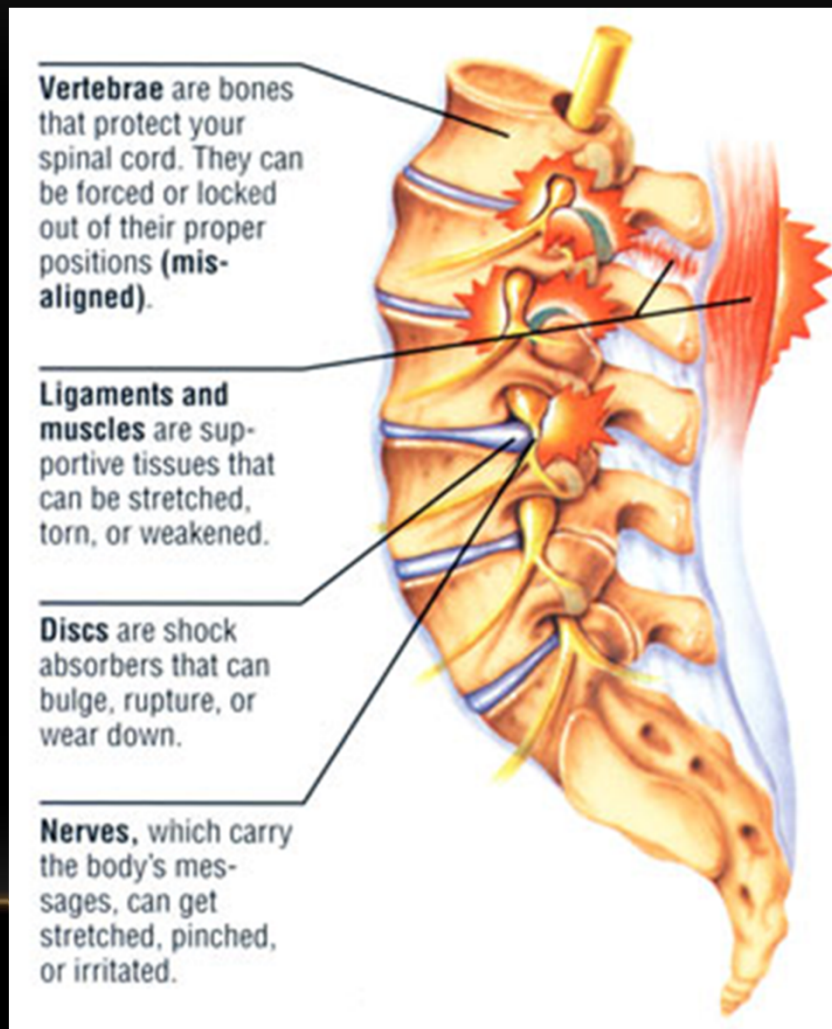
- New onset back pain peaks in the 30's (Atlas).
- Yearly prevalence increases with age, peaking in 50's and 60's (Hoy).
- After age 65 the prevalence decreases...Golden Years!



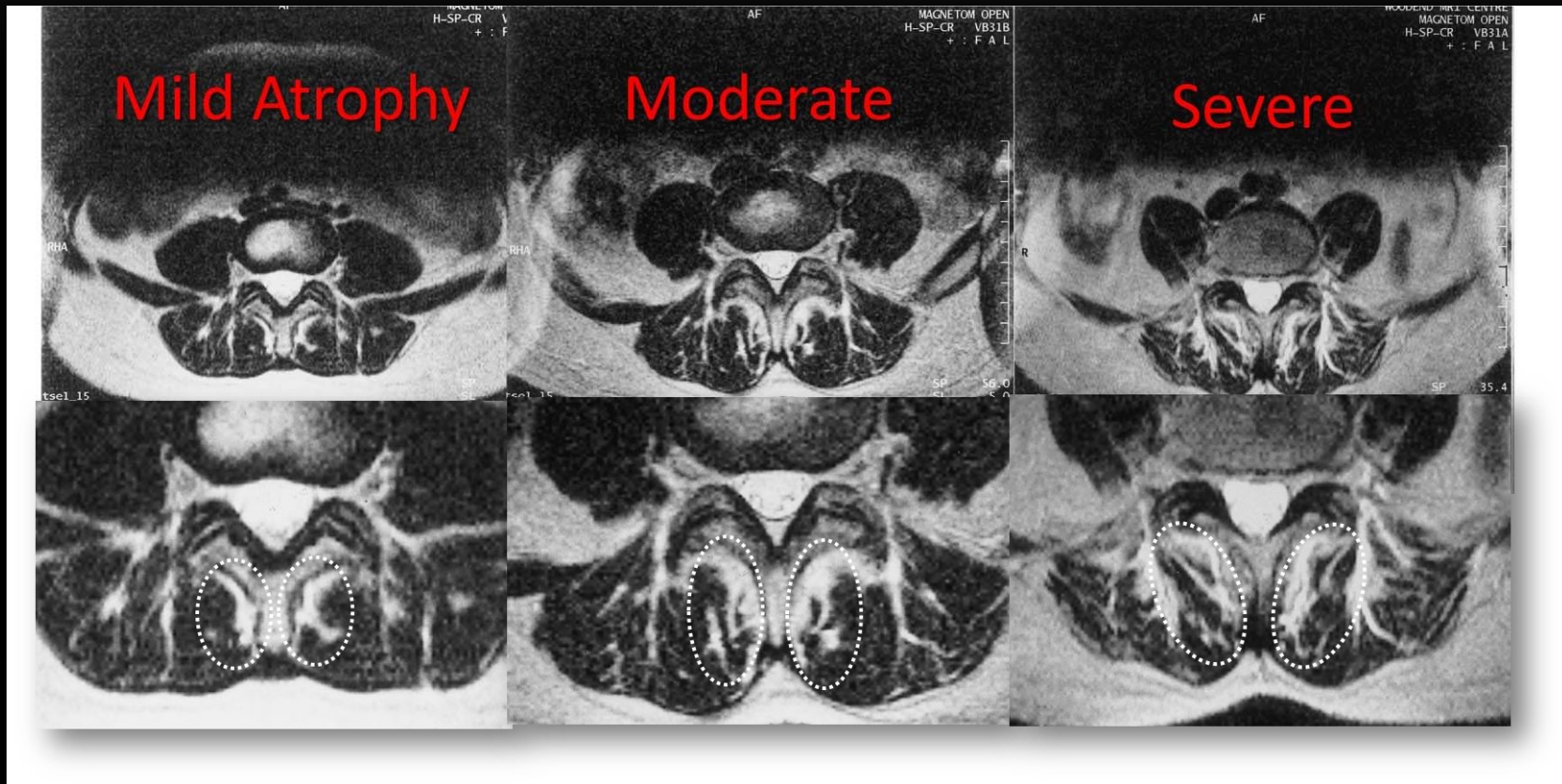
## LOW BACK PAIN: *COMMON MYTHS*

- Pain is an indicator of damage or injury (Gcoubert)
  - Actually due to pain hypersensitivity (Butler, Stagg)
- Many forms of activity, running, bending, which are not harmful are considered dangerous
  - Bending, twisting, lifting, running does not induce low back pain (Wai, Lane)
- Improvement from low back pain related to the “amazing” clinician who used manipulation, injections, surgery, etc.
  - most people can control the symptoms themselves through physical activity, stress management, healthy lifestyles (Verbeek).

# LOW BACK PAIN: ANATOMY



# LOW BACK PAIN: *IMAGING*



Paraspinal Muscle Atrophy

# LOW BACK PAIN: *NORMAL AGE -RELATED DEGENERATION*

- Everyone develops age related degeneration of the spine...its universal
  - Like grey hairs and wrinkles



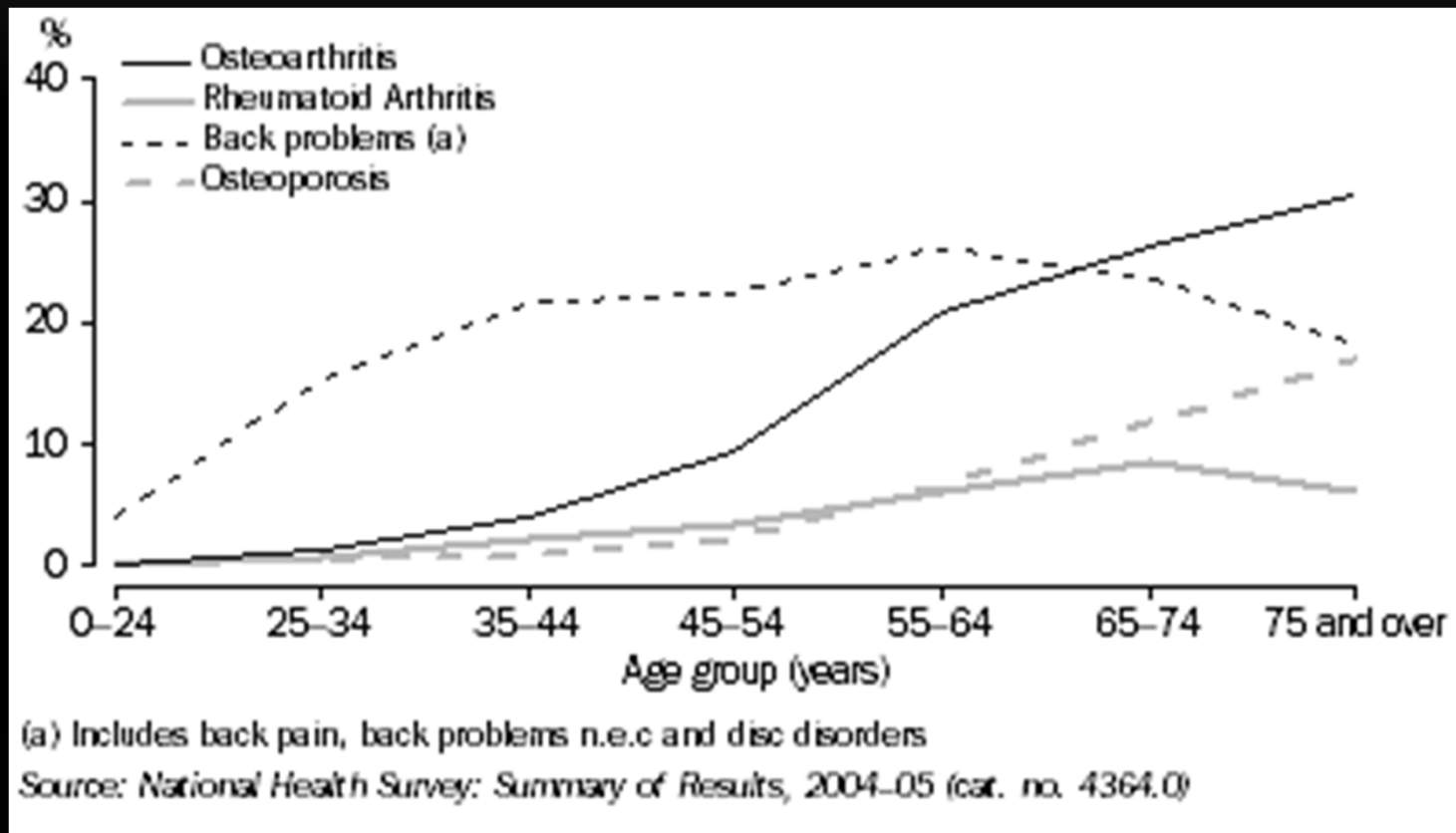


## LOW BACK PAIN: *IMAGING*

- Spinal degeneration in asymptomatic individuals increased from 37% of 20-year-old individuals to 96% of 80-year-old individuals. (Brinjikji)



# LOW BACK PAIN: *NORMAL AGE -RELATED DEGENERATION*



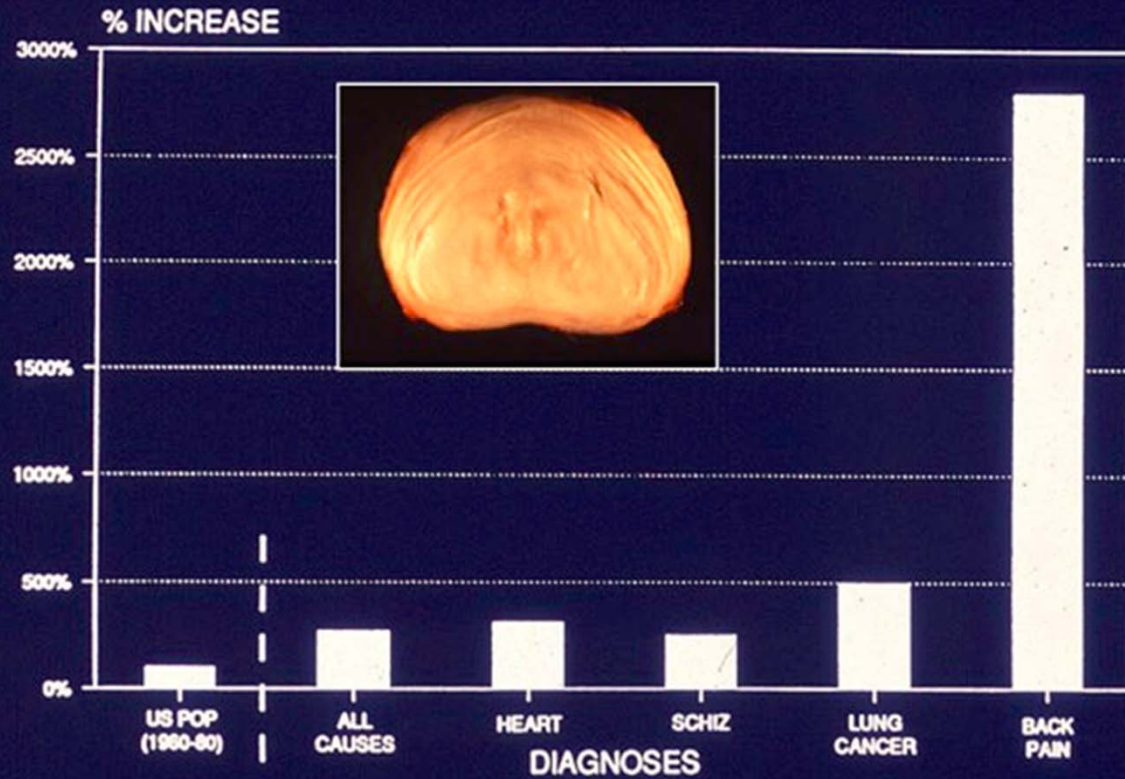
# LOW BACK PAIN: *RECOVERY*

- 90% of new onset back pain will resolve in 6 weeks(Carey).
- 20-44% of people will have recurrences of their back pain (Meidema)
- 5-20% will become chronic (Shekelle)
  
- 20-25% of people never experience low back pain
  - Nervous system adaptation??



# LOW BACK PAIN: *DISABILITY*

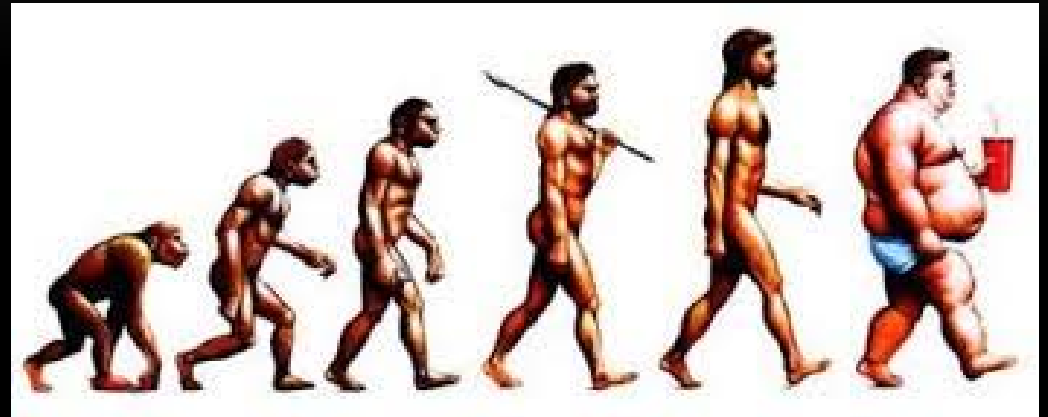
## Low Back Pain Disability Epidemic



Kang, 2015

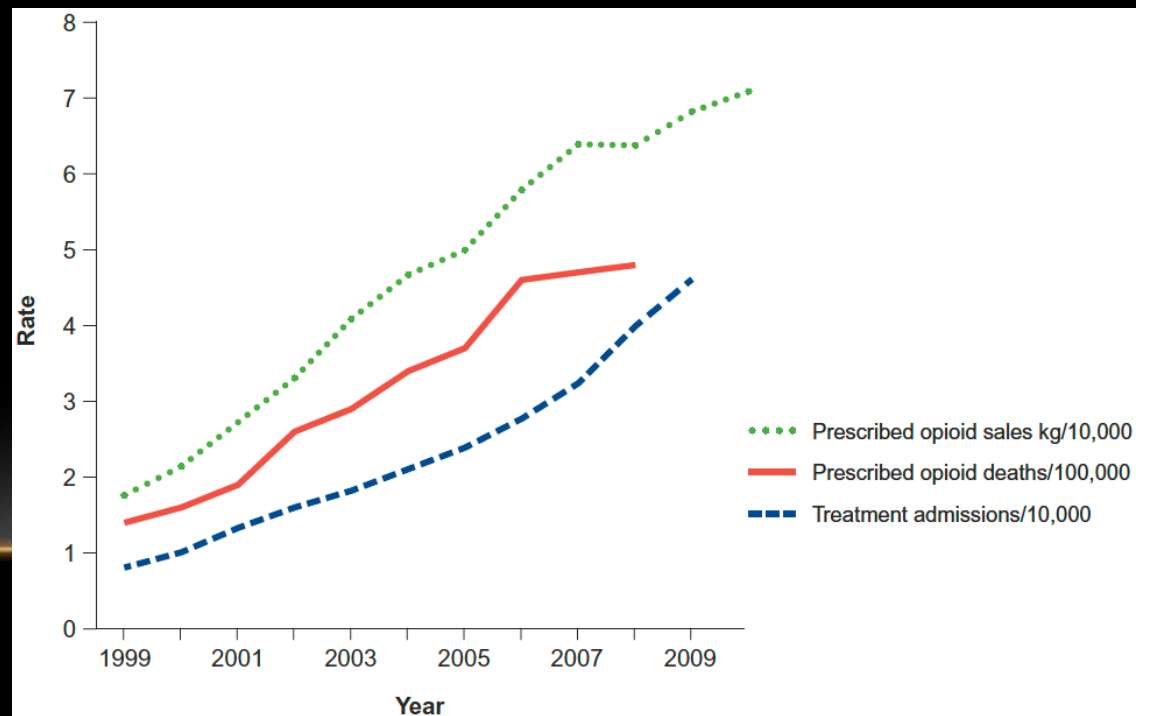
# LOW BACK PAIN: *DISABILITY*

- Risk factors (Hoy):
  - Low educational status
  - Stress
  - Anxiety
  - Depression
  - Job dissatisfaction
  - Low levels of social support in workplace
  - Smoking
  - **Lack of exercise!!!**



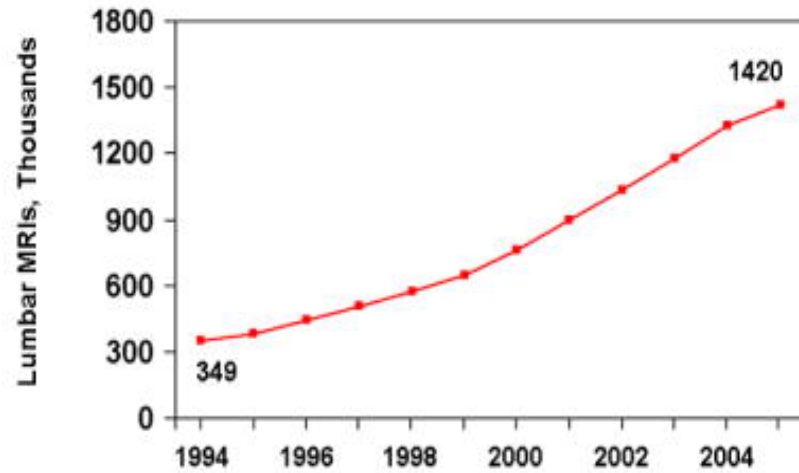
# LOW BACK PAIN: *TREATMENT*

- 108% increase in opioid/narcotics for low back Pain (Deyo)
- 228% increase in spinal injections (Manchikanti)
- 220% increase in spinal fusions (US Dept of Health and Human Services, Deyo)
- Orthobiologics??

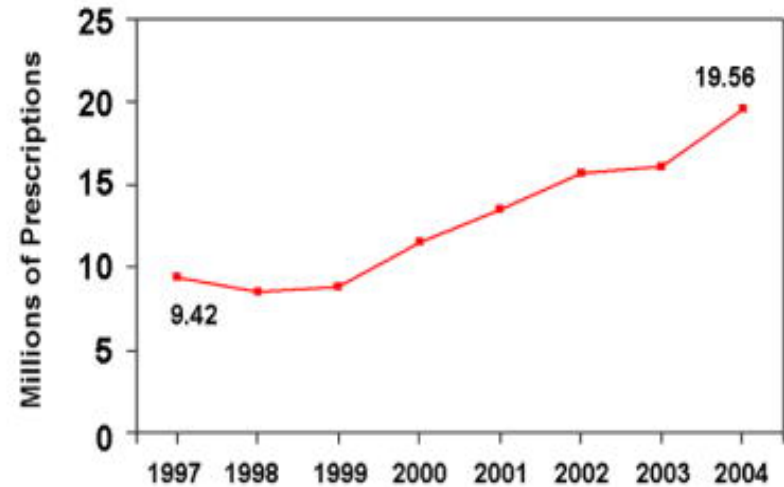


# LOW BACK PAIN: *TREATMENT*

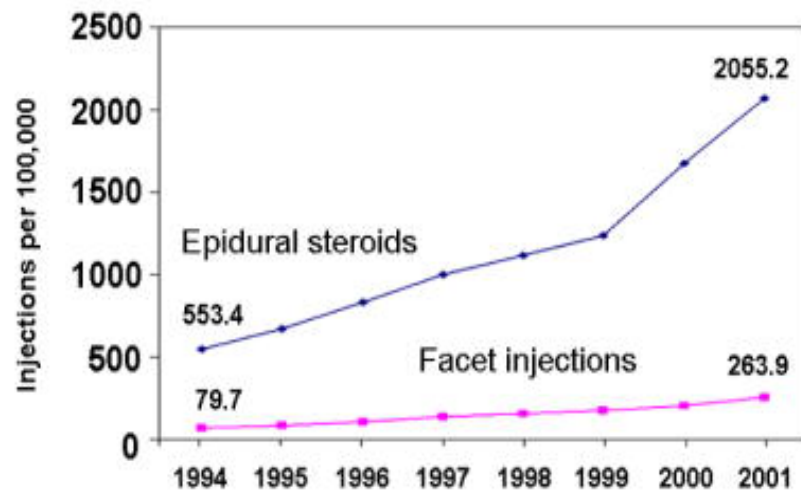
1a. Lumbar spine MR imaging, Medicare



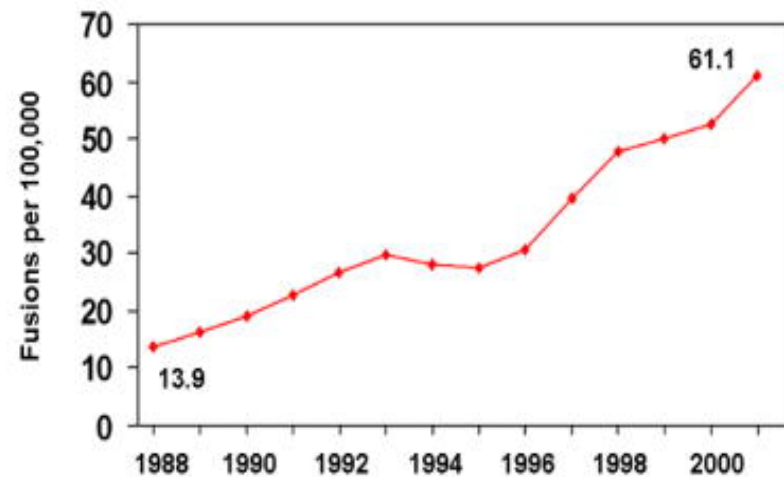
1b. Opioid analgesic prescriptions for spine problems



1c. Lumbosacral injection rates, Medicare



1d. Lumbar fusion rates, degenerative spine conditions



# LOW BACK PAIN: *TREATMENT*

- However...no change in overall incidence of back pain or disability





# LOW BACK PAIN: *TREATMENT*

- Avoid Bed rest..
  - Based on study in 1966 showing pressure on spine minimized when laying down (Nachemson)
- Early return to usual activity = quicker return to work (Deyo).
- Exercises in acute phase not likely helpful, but not harmful (Faas).
- Meds: NSAIDS / Acetaminophen – helpful
  - Opioids/Muscle relaxers not more effective than NSAIDS/Acetaminophen (Cherkin).
- Spinal injections used as adjuvant treatment to improve pain to allow people to resume activities/exercise.

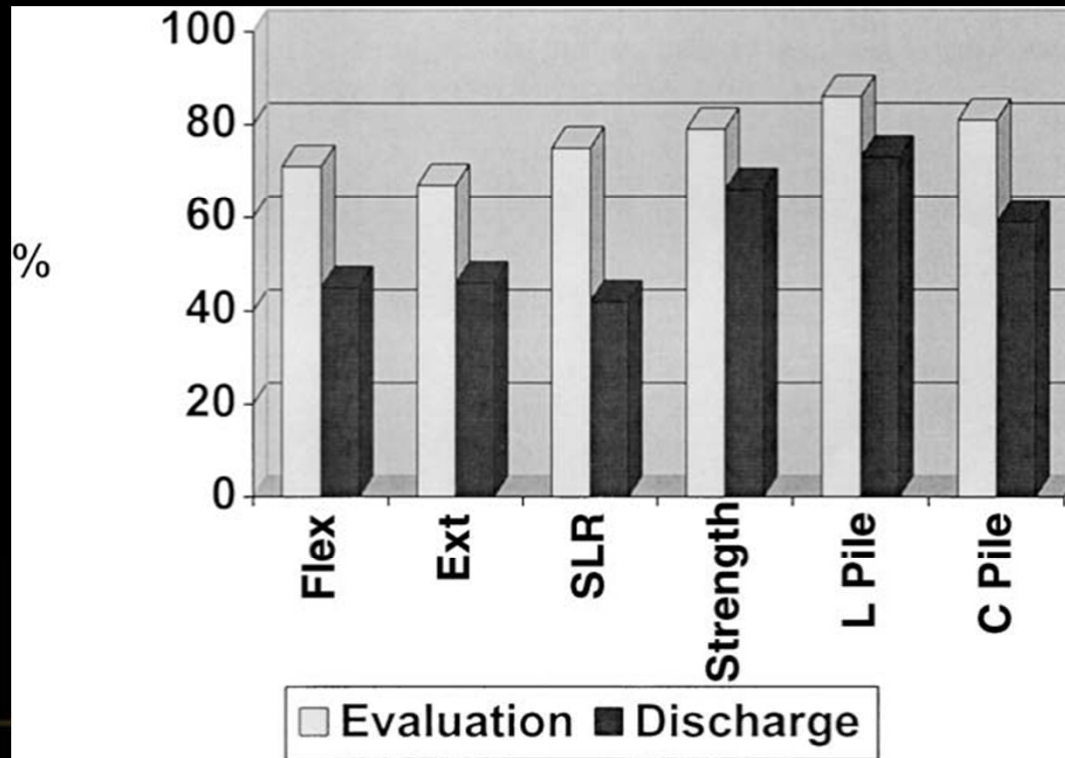
# LOW BACK PAIN: *EXERCISE*

- People who are physically active 3 days a week have lower lifetime risk of back pain (Hareby)
- Former athletes had less low back pain (Viderman)
- Greater amount of exercise does not increase risk of LBP (Croft)
- Higher levels of fitness related to improved back health (Suni)



# LOW BACK PAIN: *EXERCISE PHYSICAL THERAPY*

- The Influence of Intense Exercise-based Physical Therapy Program on Back Pain Anticipated Before & Induced By Physical activities (Rainville)



# LOW BACK PAIN: *INTENSE EXERCISE PHYSICAL THERAPY*

Table 2  
Pain and Oswestry disability scores and performance levels of physical functional test at evaluation and discharge from physical therapy

	Evaluation	Discharge	95% Confidence interval of difference		<i>t</i> Value	p Value*
			Lower	Upper		
Pain (0–10)						
Back	5.8	3.7	1.4	2.7	6.5	.001
Leg	3.5	2.3	0.5	1.9	3.5	.001
Disability						
Oswestry (0–100)	38	22	12	19	9.4	.001
Flexibility (degrees)						
Trunk flexion	87	104	12	20	8.0	.001
Trunk extension	24	33	7	11	8.7	.001
Straight leg raising	78	95	15	20	13.4	.001
Strength (% IBW)						
Back strength	58	93	30	40	14.1	.001
Lumbar PILE	20	37	15	19	16.2	.001
Cervical PILE	18	29	10	12	19.9	.001

% IBW=percent ideal body weight; PILE=Progressive Isoinertial Lifting Evaluation.

\* Two-tailed significance.

## LOW BACK PAIN: *EXERCISE BENEFITS*

- Decreased trunk strength and flexibility associated with back pain (Kato)
- Improve flexibility, strength and endurance activities (Rainville)
- Up to 54% reduction in back pain (Kankaanpaa)
- Resistance exercises and stabilization exercises reduce low back pain (Peek).
- Exercises decrease recurrence of back pain by 40% (Freburger)
- Exercise can reduce pain and improve function (Hayden)
- Exercise can improve occupational function and reduce sick leave (Moffett,Lindstrom)
- Reduce back pain-related disability (Rainville)

# LOW BACK PAIN: *EXERCISE BENEFITS*

- Aerobic Training, flexibility and Strengthening all important to decrease back pain flairs (GORDON)
- Exercises reduce back pain flairs and disability (Shiri)
- Active Exercises more effective than passive therapy (Owen)
- Strengthening exercises more effective than other exercises for back pain (Searle, Tian)
- Strengthening exercises improves pain and function in the elderly (Zahari)
- Posterior chain exercises greater than general exercise for back pain (Tataryn)
- Review found the exercises cuts the risk of getting back pain by *50%* compared to passive treatments (Stephens)
- Free weight strengthening improves pain, function and fatty infiltration.
  - Squats, deadlifts, lunges, step-ups

# LOW BACK PAIN: *EXERCISE BENEFITS*

- Telomers: caps at end of chromosomes that shortens with age
  - Higher levels of activity = longer telomers
  - Activity >30min 5 days a week had telomers that were 9 years younger than those that were sedentary. (Tucker)
  - High Intensity Interval Training training lengthens telomers (Werner)
- Mitochanodrial quality and activity decreases with age leading to age-related diseases
  - Exercised Muscles have more mitochandria (Haas)

# LOW BACK PAIN: *EXERCISE BENEFITS*

- Weight Loss compared to Exercise.
  - Review of observational studies (Gaesser)
    - Weight loss associated with a 10-15% reduction in mortality.
    - Increased exercise activity associated with 15-60% reduction in mortality.

## Exercise and Longevity

Middle-aged people who walked atleast 7K steps a day showed 50-70% decrease in mortality from CVD and cancer over the next 10 year period. (Paluch)



# LOW BACK PAIN: *EXERCISE PHYSICAL THERAPY*

- High Intensity, constantly varied, functional movements: Exercise with a Target Heart rate 60-85% intensity using the Karvonen formula.
- Non-pain contingent, quota-based physical therapy: Stepwise progressive therapy where the focus is on functional gain instead of pain reduction



# LOW BACK PAIN: *EXERCISE*

- Resistance exercise program.
  - Type of exercise not as important as doing regular resistance strength program (Dettori, Bendix, Bentsen)
    - High intensity workout more important than frequency (Stagg)
- Spinal strengthening (the core) exercises and leg exercises important to include.
  - Exercising will cause discomfort/pain initially.
  - Safe to continue through mild/tolerable pain...not harmful pain.

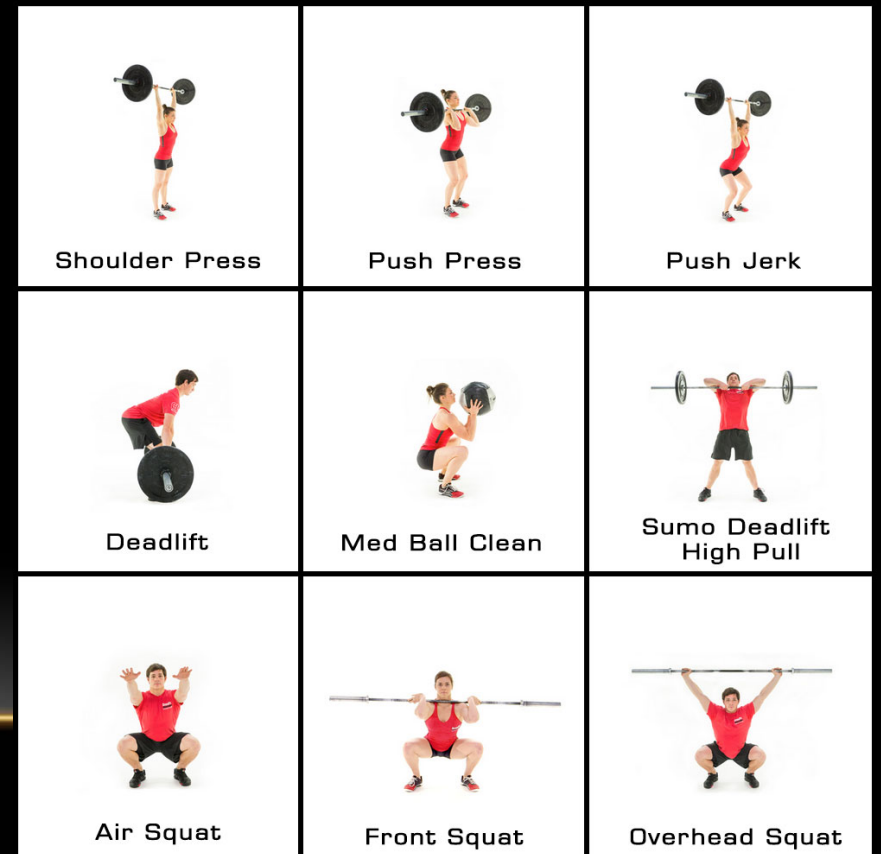
# EXERCISE: *CROSSFIT*

- High Intensity, Constantly-Varied, Functional Movements
  - 2017 study compared 13 studies – same injury rate as other exercise programs (Meyer)
  - Improves CV endurance (VO2max), stamina, strength, flexibility, power and balance (Gianzina)
  - Improves lean body mass (Wagener, Shultz)
  - 7% lower body fat, greater isometric strength, peak aerobic capacity compared to recreational exercise (Mangine)
  - Higher levels of sense of community, satisfaction and motivation (Claudino)



# EXERCISE: *CROSSFIT*

- Educated coaching focusing on movement dysfunction and abnormal muscle strain patterns
- Help patients understand how to train with quality movements to restore proper function and directly impact their daily lives.



# LOW BACK PAIN: *NUTRITION*

- Multiple studies show whole food plant-based diet may alleviate painful symptoms
  - Reduce inflammation (Fraser, Sutcliffe)
    - Decreased CRP
    - Decreased IHD and Colon CA
    - Decreased Erectile Dysfunction
  - Reduce pain and Improve function in chronic musculoskeletal pain patients (Towery)
  - Associated with healthier weight (Tonstad)
    - Lower BMI
  - Promote healthy gut bacteria (Tomova)
    - Microbial metabolites can have diverse positive health effects
      - local anti-inflammatory and immunomodulatory effects
      - systemic anti-obesogenic and antioxidant effects
  - Improves SF-36 self-assessed measures of functional status among osteoarthritis patients (Clinton)

# LOW BACK PAIN: *NUTRITION*

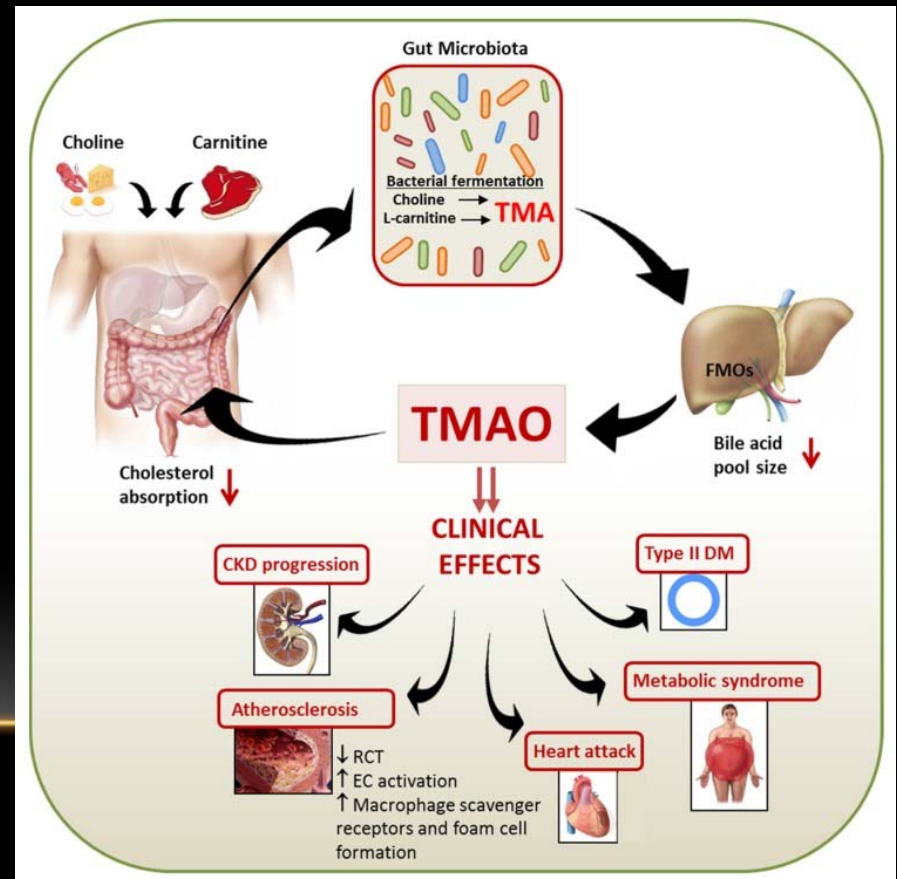
- Kjeldsen-Kragh J et al:
  - 1-year intervention tested the effects 3.5 months of a gluten-free vegan diet and gradual adoption of a vegetarian diet for the remainder of the study period.
    - Improved number of tender and swollen joints
    - Decreased pain score
    - Decreased morning stiffness
    - Increased grip strength
    - Erythrocyte sedimentation rate, C-reactive protein, White blood cell count
    - Improved health assessment questionnaire score
  - These improvements were maintained after 1 year

# LOW BACK PAIN: *NUTRITION*

- McDougall et al:
  - 4-weeks low-fat vegan diet
    - Significantly improve joint pain, stiffness, swelling
    - Improved Function Score

# LOW BACK PAIN: *NUTRITION*

- Animal products increase trimethylamine N-oxide or TMAO.
  - TMAO is produced when gut bacteria digest choline, lecithin and carnitine,
    - nutrients abundant in animal products
- TMAO linked to increase inflammatory response (*Abbasi*).

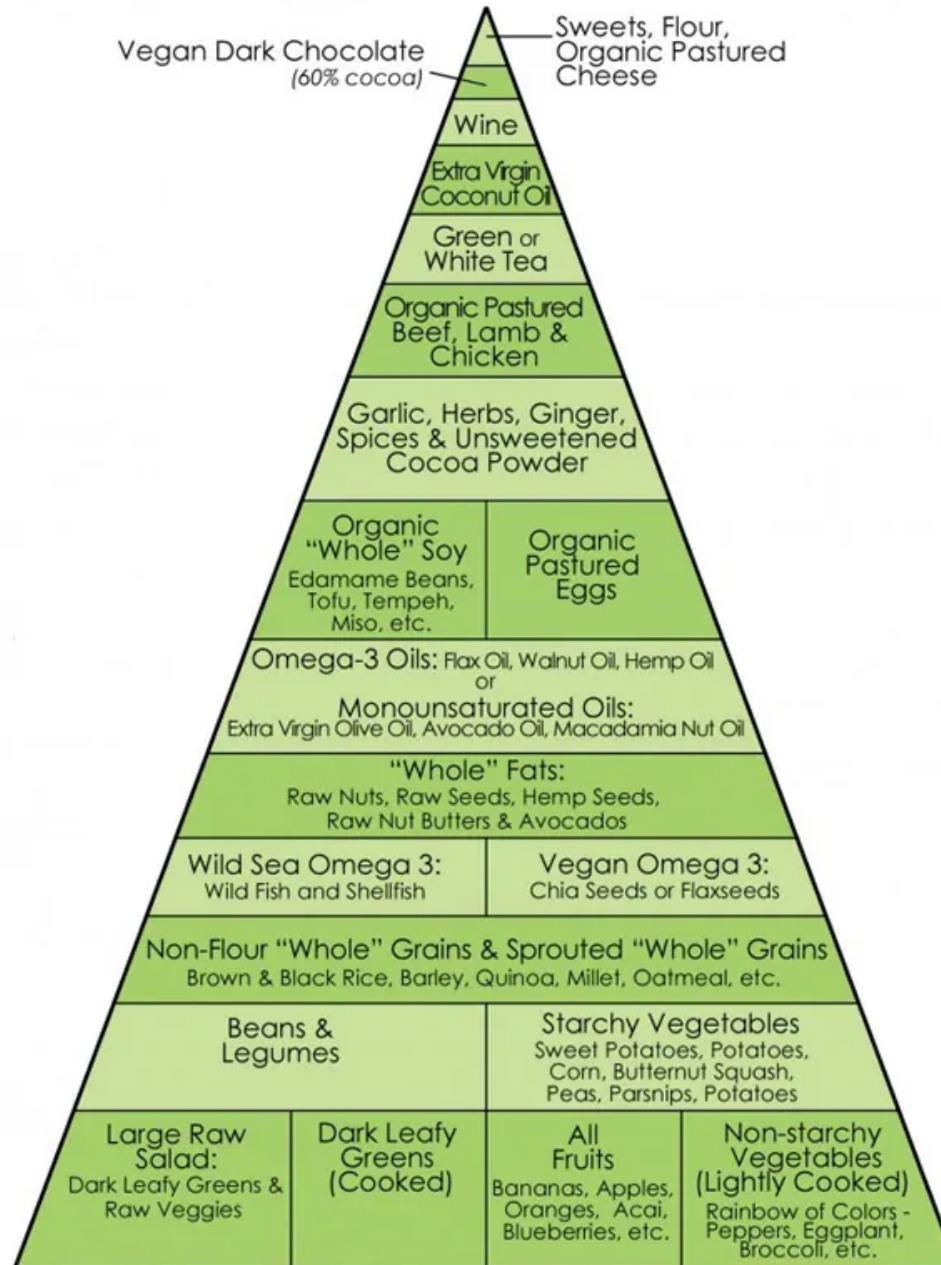




# LOW BACK PAIN: *NUTRITION*

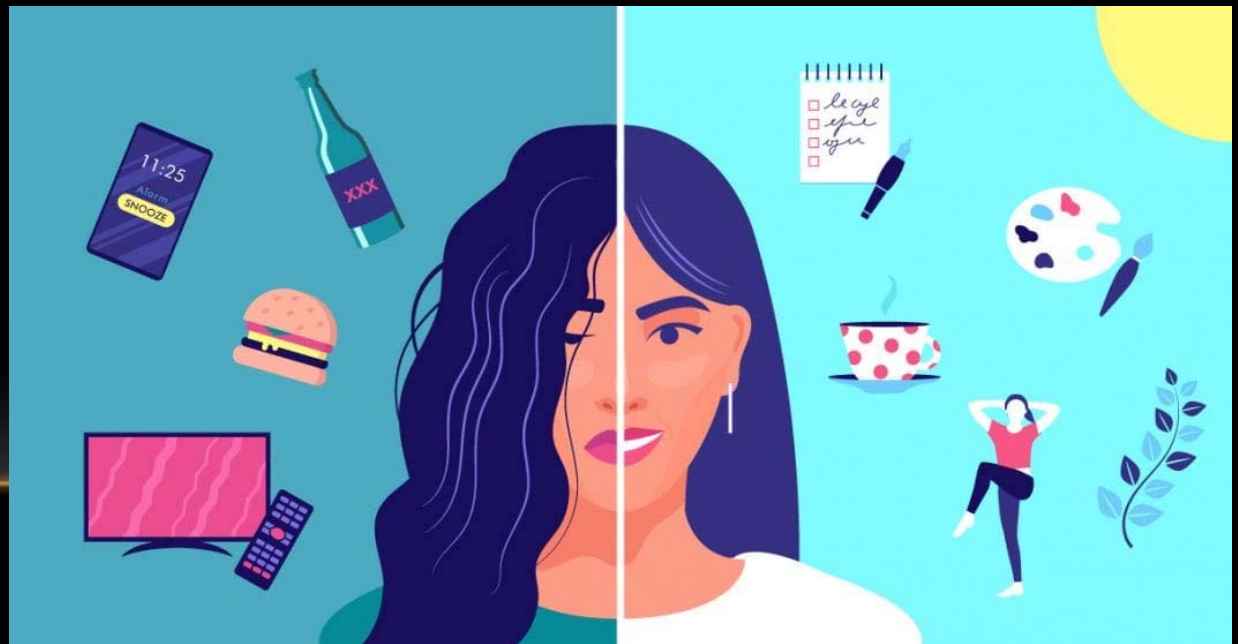
- Reduce:
  - *Food made in a factory*
  - Processed foods: soft drinks, candy, chips, foods with added sugar
  - Simple Carbohydrates: white bread, bagels, pizza
  - Red Meat
  - Fried Food
- Increase:
  - *Food grown on a farm*
  - Veggies
  - Fruits
  - Nuts
  - Legumes and Beans
  - Water!

## The Clean Cuisine Food Pyramid: An Easy Anti-Inflammatory Diet Guideline



# LIVE A HEALTHY LIFESTYLE

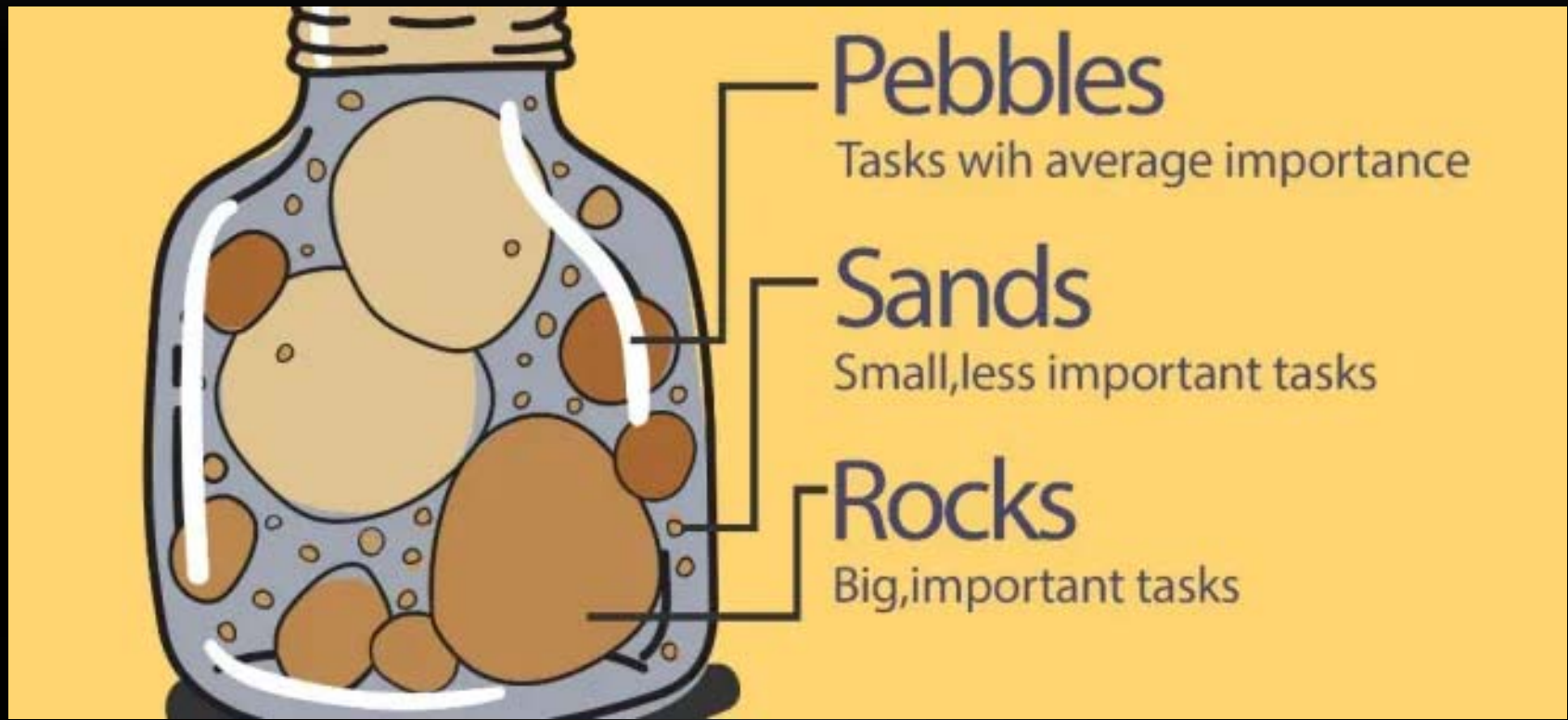
- People who follow 5 Habits increase life expectancy by up to 10 years (Yanping)
  - Eat nutritious whole food
  - Exercise regularly ( 30 min mod to high intensity)
  - Maintain healthy body weight (BMI<25)
  - Limit alcohol (1-2 5oz glasses per day)
  - No smoking

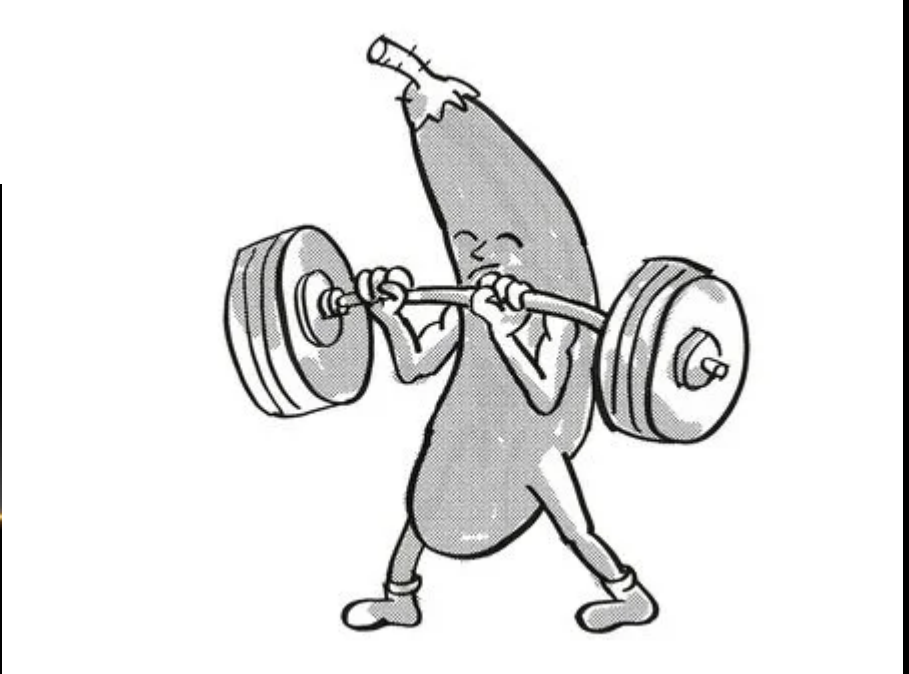
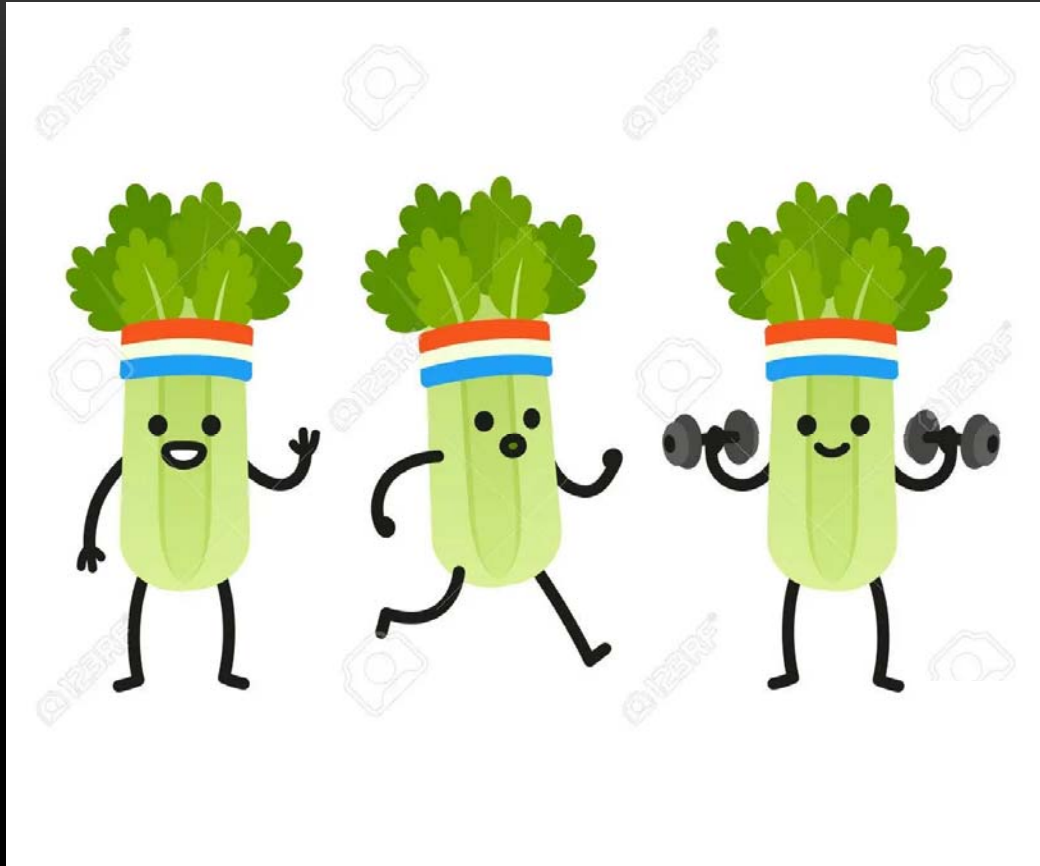


## LOW BACK PAIN: *PHYSICIANS GOALS*

- Shape patient's beliefs and better contextualize what is happening to their body (e.g. rarely is tissue damage the biggest concern)
- Eliminate fears that everyday activities are dangerous even if they are difficult initially
- Empower patients to regain control through active self-management strategies such as physical activity and nutrition (O'Sullivan)

# FOCUS ON WHAT'S IMPORTANT





## LOW BACK PAIN

- “It’s not a question of whether you will hurt, or of how much you will hurt; it’s a question of what you will do, and how well you will do it, while pain has her wanton way with you.”

Excerpt From Daniel James Brown: *The Boys in the Boat*.

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