An Integrative Approach to Treating Inflammation

Robert Kress, RPh

Live Activity Handout
2 slides per page
An Integrative Approach to Treating Inflammation

ACTIVITY DESCRIPTION
Inflammation is the root or can play a major role in numerous diseases, from heart disease, diabetes, Alzheimer’s, arthritis, and even disease states of the digestive tract. Complementary therapy has proven to be effective and often comes with a lower side-effect profile than many anti-inflammatory medications such as NSAIDS (Non-steroidal anti-inflammatory medications). We will cover how lifestyle aspects, including exercise, diet, relaxation strategies and nutritional therapy can support healthy inflammation.

TARGET AUDIENCE
The target audience for this activity is pharmacists, pharmacy technicians, and nurses in hospital, community, and retail pharmacy settings.

LEARNING OBJECTIVES
After completing this activity, the pharmacist will be able to:
- Describe the role of inflammation, from acute to chronic disorders and associated disease states
- Explain how lifestyle medicine, including diet, exercise, and relaxation strategies can play a role
- List natural and complementary therapies for treating both acute and chronic inflammation

After completing this activity, the pharmacy technician will be able to:
- Describe the role of inflammation, from acute to chronic disorders and associated disease states
- Explain how lifestyle medicine, including diet, exercise, and relaxation strategies can play a role
- List natural and complementary therapies for treating both acute and chronic inflammation

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ABOUT THE AUTHOR
Robert Kress, RPh, graduated from Temple University School of Pharmacy in Philadelphia PA in 1994. After becoming disenchanted with chemical dominant based medical system, Robert took his passion for nutrition and became board certified in clinical nutrition through the Clinical Nutrition Certification Board, as well as trained as a compounding pharmacist through the Professional Compounding Centers of America.

During this time, with his wife Amy, opened their own compounding and nutritional clinic, which blossomed into a complete anti-aging clinic housing other integrative practitioners. Robert became certified in Quantum Reflex Analysis, a practice of kinesiology, as well as have trained and certified in other modalities such as Reiki and auricular acupuncture.

Currently, Robert consults with both with patients to enhance their health through lifestyle medicine as well other practitioners to help integrate, promote and implement natural medicine in their practices. Robert also provides regular educational Wellness Workshops and writes regularly on the topic of lifestyle medicine and integrative care.

Robert believes as pharmacists, we are offered the perfect opportunity to integrate natural medicine into our practices, as its core to the history of pharmacy. Patients are looking for natural solutions for their health, while practitioners are looking towards integrative care to help solve their clients problems and enhance their practices.

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An Integrative Approach to Preventing & Treating Inflammation

Objectives

• Describe the role of inflammation, from acute to chronic disorders and associated disease states
• Explain how lifestyle medicine, including diet, exercise, and relaxation strategies can play a role
• List natural and complementary therapies for treating both acute and chronic inflammation
Inflammation

• Inflammation is a common and innate response by the body, in response to injury, pain, allergy, illness, pathogens, or stress.
• Inflammation also plays a positive role as a stressor to induce an adaptive response (in episode, short duration) to strengthen muscles and vessels.
• Inflammation is a process designed for protection, healing, as well as strengthening.

http://www.webmd.com/arthritis/about-inflammation

Inflammation

• The natural inflammatory response is brief, a period of several days or less.
• Inflammation can be acute (in the short term) or chronic (long term.)
• The inflammatory process is one of breaking down, and building up.
Inflammation

- The inflammatory process is designed to break down tissue, target damaged tissue, pathogens, and foreign agents BEFORE it starts building back up.
- When inflammation becomes chronic, it prevents the proper building up of damaged area, while influencing various disease states including: heart disease, diabetes, arthritis, Alzheimer’s disease, cancer, neurological issues, and more.

Disorders & Diseases States Inflammation Can Influence or Cause

- Arthritis
- Digestive issues
- Neurological disease states
- Heart disease
- Obesity
- Insulin resistance/Diabetes
- Depression
- Autoimmune disorders
- Cognitive issues/Alzheimer’s
- Cancer
- Asthma
- High blood pressure
- Elevated cholesterol
- Fibromyalgia
- Chronic fatigue

http://www.medicalnewstoday.com/articles/248423.php
Inflammation is Everywhere

Inflammation is involved in numerous processes of the body and calls upon various systems of the body:
• Vascular system (veins, arteries, capillaries)
• Immune system
• Cells
• Hormones

https://www.livescience.com/52344-inflammation.html

Inflammation: The Pharmacists Role

• Educate on both preventative and treatable options for inflammation
• Assess current medication therapies, diet and lifestyle issues which can lead to chronic inflammation
• Recognize the drug induced nutrient depletions of medications used to treat inflammation
• Offer options and alternatives to both patients and physicians
The Path of Inflammation

1. Insult to body (Trauma, infection, burn, chemical irritant, frost bite, cut, allergic reaction, etc.)
2. PRR (Pattern recognition receptors) at the point of insult, begin to coordinate elimination of pathogens and infected cells with release various inflammatory mediators.
3. Inflammatory mediators initiate vasodilation which increases blood flow to injury site, and warms the area.

4. Blood vessels then become more permeable to allow plasma and leukocytes (clean up injury site, mopping up pathogens, and oversee inflammatory process) to flow through vessel walls to the injured tissue.
5. The plasma moves into the tissue = fluid build up/swelling
6. At the same time, the body releases bradykinin which increases pain sensitivity.
The Healing Result of Inflammation

Heat, redness, swelling, pain, and loss of function are necessary to discourage use and allow proper healing.

When Inflammation Becomes Chronic

Where inflammation is designed to be a short process and inflammatory mediators are short lived...

It’s the constant induction of inflammation which leads to chronic inflammation
Various Causes of Chronic Inflammation

- Diets consisting of high sugar, refined carbohydrates, industrial fats, gluten, factory fishing and CAFO (confined Animal Feeding Operations) Meat.
- Diets low in omega 3 fatty acids and high in omega 6 fatty acids
- Lack of sleep
- Sedentary lifestyle
- Inadequate recovery from stressful exercise routines
- Chronic stress
- Poor acute/chronic stressor ratio
- Lack of down time
- Lack of nature time
- Poor digestive health
- Tobacco smoking
- Genetics

Testing for Inflammation
C – Reactive Protein

- Hs-C.R.P (high sensitivity c-reactive protein test)-
  - C-Reactive Protein (CRP) is found in the blood
  - Levels become elevated when the body detects an infection or need for inflammation
  - Elevated levels may also indicate future problems including cardiovascular disease and atherosclerosis
- C-Reactive Protein can become elevated due to diabetes, depression, inflammation, obesity, or from an infection.
- hs-CRP range: <1.0 mg/L = low risk; >3.0 mg/L = high risk

Natural supplements to lower CRP

- Vitamin E Mixed Tocopherols
- Co Enzyme Q10
- Vitamin C
- Fish Oil
- Curcumin
- Magnesium
- Green tea
Interleukin-6 (IL-6)

• IL-6 is a cytokine which acts on other cells to help regulate and/or promote an immune response
• IL-6 stimulates the production of acute phase reactants, proteins that increase in the blood with conditions that cause inflammation or tissue injury
• There is a single nucleotide polymorphism (SNP) which leads the afflicted to secrete more pro-inflammatory IL-6 than people without
• IL-6 is a potent inducer of CRP

Natural Supplements to Lower IL-6

• CoQ10
• Magnesium
• Vitamin D3
• Zinc
• Curcumin
• Boswellia
• EPA/DHA
Erythrocyte Sedimentation Rate (ESR)

• A non-specific test to help detect inflammation associated with conditions such as infections, cancers, and autoimmune diseases
• Tests the rate at which red blood cells separate from the plasma
• High ESR indicates some inflammation
• Best or often to be used with other tests due to its non-specific nature


Natural Supplements to Lower ESR

• Curcumin
• Boswellia
• EPA/DHA
• Ginger

Pharmacotherapy

• NSAIDs
• Corticosteroids
• Immune suppressors
• Biologics

NSAIDS

• Non-steroid anti-inflammatory drugs are the most common pain relieving drugs in the world
• Reduce pain, swelling, and fever
• NSAIDs can cause ulcers and other problems in your esophagus, stomach, or small intestine
• High blood pressure
• Kidney problems

NSAIDS and Heart Disease

• NSAIDs increase risk of heart disease and stroke
• COX 2 Inhibitors believed to be the strongest culprit due to the fact that COX 2’s help make prostacyclin which helps inhibit tightening of arteries and clotting
• COX 2’s rofecoxib (Vioxx) and valdecoxib (Bextra) pulled from market due to risk of heart attacks and strokes

http://www.webmd.com/arthritis/features/pain-relief-how-nsaids-work#3

NSAIDS and Heart Disease

FDA 2015 heightened warnings:
• The new warnings from the FDA point out:
  • Heart attack and stroke risk increase even with short-term use, and the risk may begin within a few weeks of starting to take an NSAID.
  • The risk increases with higher doses of NSAIDs taken for longer periods of time.

FDA Drug Safety Communication: FDA strengthens warning that non-aspirin NSAIDs can cause heart attacks or strokes, (July 6,2015). Available at: https://www.fda.gov/Drugs/DrugSafety/ucm451800.htm
NSAIDS and Heart Disease

FDA 2015 heightened warnings:

• The risk is greatest for people who already have heart disease, though even people without heart disease may be at risk.

• Previous studies have suggested that naproxen may be safer than other types of NSAIDs, but the new evidence reviewed by the expert panel isn’t solid enough to determine that for certain.

http://www.health.harvard.edu/blog/fda-strengthens-warning-that-nsaids-increase-heart-attack-and-stroke-risk-201507138138

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NSAIDS Drug Induced Nutrient Depletions

• Folic acid
• Iron
Corticosteroids

• Steroids work by decreasing inflammation and reducing the activity of the immune system
• Used for acute issues including allergic reactions, inflammation, or long term therapy such as asthma, or certain rheumatologic inflammatory conditions (such as: systemic vasculitis, myositis, rheumatoid arthritis, systemic lupus erythematosus)
• Steroids may be the main therapy for certain diseases. For other conditions, steroids might only be used sparingly or when other measures have not been successful often due to long term side-effect profile

https://my.clevelandclinic.org/health/articles/corticosteroids

Corticosteroids Side-effects

• Increased appetite, weight gain
• Sudden mood swings
• Muscle weakness
• Blurred vision
• Increased growth of body hair
• Easy bruising
• Lower resistance to infection
• Swollen, "puffy" face
• Acne
• Osteoporosis
• Worsening of diabetes
• High blood pressure
• Stomach irritation
• Nervousness, restlessness
• Having difficulty sleeping
• Cataracts or glaucoma
• Water retention, swelling

http://www.mayoclinic.org/steroids/art-20045692?pg=2
Corticosteroids Drug Induced Nutrient Depletions

- Calcium
- Vitamin D
- Potassium
- Zinc
- Magnesium
- Vitamin C
- Folic acid
- Vitamin B12
- Selenium
- Chromium
- Vitamin A

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Immune Suppressors and Biologics

Azathioprine
- Organ transplant rejection, rheumatoid arthritis
- Nausea, vomiting, hair loss, liver disease, suppressed immune system, decreased ability to fight infection, increased risk of cancers

Mercaptopurine
- Acute lymphocytic leukemia, Crohn’s disease, ulcerative colitis
- Nausea, vomiting, suppressed immune system, decreased ability to fight infection, increased risk of cancers

https://medlineplus.gov/druginfo/meds/a682653.html
Immune Suppressors and Biologics

Methotrexate
• Severe psoriasis, rheumatoid arthritis, cancer therapy
• Liver damage, ulcers, increase risk of lymphoma’s, suppressed immune system, decreased ability to fight infection

TNF Inhibitors
• TNF (tumor necrosis factor) are a group of medicines that suppress the body's natural response to tumor necrosis factor (TNF), a protein produced by white blood cells that is involved in early inflammatory events.
• TNF-alfa inhibitors treat a wide range of inflammatory conditions such as rheumatoid arthritis (RA), psoriatic arthritis, juvenile arthritis, Crohn's disease, ulcerative colitis, ankylosing spondylitis, and psoriasis.
TNF Inhibitors

- Humira
- Remicade
- Enbrel
- Side-effects include: lymphomas, infections, especially reactivation of latent tuberculosis, congestive heart failure, demyelinating disease, induction of auto-antibodies.


IL-6 Inhibitors

- Actemra, Sylvant, Kevzara
- Used to treat and areas of research of cytokine IL-6 related disorders including rheumatoid arthritis, prostate cancer, renal cell carcinoma, ovarian cancer, large cell lung carcinoma.
- Side-effects include: immunosuppression, infections, decreased platelet counts, GI perforation, hepatic impairment.

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2621374/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2621374/)
Lifestyle Medicine

- Diet
- Supplements
- Exercise
- Stress Management

Diet

- A diet can either be anti-inflammatory or pro-inflammatory

- The food one eats plays a critical role in levels of systemic inflammation; both acute and chronic
Diet

Where there is no official anti-inflammatory diet, anti-inflammatory food choices include:

- Omega-3 rich foods (wild caught fish (salmon), flax seeds, chia seeds, walnuts, grass fed meats
- Fruits and Vegetables - high in antioxidants, vitamins, minerals and enzymes (leafy greens, cruciferous vegetables, berries, melon, papaya, avocado, pineapple
- High Sulfur foods - Contain MSM (methylsulfonylmethane) reduce inflammation and help build tissue (onions, garlic, asparagus, cabbage)
- Others - Dark chocolate (70% or more cacao), cruciferous vegetables (kale, broccoli, brussels sprouts), avocados, mushrooms, olive oil, green tea, turmeric

Diet tips

- Grows on a plant eat it, created in a plant, don’t
- Whole Foods rich in phytonutrients
- 8 to 10 servings of colorful vegetables every day - different colors, different beneficial attributes, phytonutrients and antioxidants.
- Healthy liquid choices - green tea, water, unsweetened tea
- Healthy proteins and Lean animal protein - fish, turkey, chicken, buffalo, lean lamb, vegetables, nuts, beans, tofu
- Good oils - olive, sesame, nut oils, coconut, avocado
- Good fats - Omega 3 fatty acids, cold water wild salmon, sardines, herring, seaweed, coconut oil, avocado
- High fiber - whole beans, whole grains, nuts, seeds, vegetables
- Low in saturated fats - grass fed beef (less sat fat)
- Good Carbohydrates - Low glycemic, high fiber

Inflammatory Foods

- Excessive sugar / refined sugar
- Processed foods
- Industrial/hydrogenated fats and oils
- Grains and Gluten
- Factory farmed fish and CAFO meats
- Food Intolerances
- Nightshades
- Insufficient omega-3’s- form the precursors for anti-inflammatory eicosanoids
- Excessive omega-6’s- form the precursors for inflammatory eicosanoids

http://www.health.harvard.edu/staying-healthy/foods-that-fight-inflammation

Exercise

- The right type of exercise in the right quantities lowers systemic inflammation, while too much of the wrong type of exercise (or even too much of the right kind) increases inflammation.
- Being too sedentary or extreme overtraining can be linked to inflammation.

http://jep.physiology.org/content/103/1/376.short
How Inflammation Helps Exercise

• Some degree of inflammation is necessary to attain your goals of exercise; increased stamina, strength, and improved work capacity
• The acute stressor of intense exercise initiates a transitory, temporary, but powerful inflammatory response
• The body gets stronger through the inflammatory response to the stress and by rebuilding and refortifying its tissues
• An effective exercise program is composed of periodic of acutely stressful training sessions, met with plenty of recovery time


Exercise that lowers inflammatory markers

• Extended exercise programs generally reduce markers of inflammation (such as C-reactive protein) over the long term
• American adults who engaged in frequent physical activity tended to have lower CRPs than sedentary adults
• In type 2 diabetes, long term high intensity resistance and aerobic training reduced inflammatory markers over the course of a year
• Endurance combined with resistance training reduced CRP in young healthy women better than endurance training alone

https://www.hindawi.com/journals/omcl/2017/8523728/
https://www.researchgate.net/publication/51692936_Endurance_and_resistance_training_lowers_C-reactive_protein_in_young_healthy_females
Exercise can spike inflammatory markers

- Volleyball practice spikes IL-6 in both male and female elite volleyball players
- Acute exercise spiked CRP in cardiovascular disease patients (but a four-month exercise program lowered it)

Conclusion: Regular exercise tends to lower markers of systemic inflammation while acute exercise increases markers of inflammation.

Inadequate Recovery From Exercise

- Over training can lead to chronic inflammation
- Like our brains, our bodies need downtime for rest, repair and rebuild
- Where periodic brief intense bouts of exercise induce inflammation that support muscle growth, strength and stamina, there needs to be down time to let the inflammation subside
- Endurance training leads to higher inflammatory markers than resistance and interval training
- Ultramarathoners have lower CRP levels than marathoners


http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0022748
Sedentary Lifestyle and Inflammation

• Lack of activity is strongly linked to systemic, low-grade inflammation
• Increased convenience has led to challenges in health
• Active couch potato syndrome linked to inflammation

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3404815/

Supplements- Foundational

Multivitamin

Optimized Vitamin D

Omega 3 Fatty Acids
Supplements

- Curcumin
- Boswellia
- Proteolytic Enzymes
- MSM
- Ginger

Foundational Supplements

**Multivitamin/Multi-mineral/micronutrient**

- A multivitamin provides a balanced nutritional profile with ingredients such as boron, copper, manganese, selenium, zinc, and antioxidants which can provide anti-inflammatory benefits as well as support for healthy tendons, ligaments, and joints.
Optimized Vitamin D

- Vitamin D has shown powerful anti-inflammatory and immune supporting benefits. The anti-inflammatory role of vitamin D is broad and it’s not just for aches and pains.
- Optimizing ones vitamin D levels to 40 to 60 ng/ml


Omega 3 fatty acids

- In addition to systemic anti-inflammatory action, omega 3 fatty acids have shown benefits in support of; cardiovascular health, joint comfort, cognitive health and function, respiratory health, immune health, gastrointestinal health and skin health.

http://www.umn.edu/health/medical/altmed/supplement/omega3-fatty-acids
Curcumin

- Healthy inflammatory balance
- Supports cellular health
- Immune support and modulation
- Other benefits including digestive, cardiovascular, cognitive, kidney, liver, mood, metabolic, detoxification.

http://www.sciencedirect.com/topics/neuroscience/curcumin

Boswellia

- Supports structural integrity, motility and comfort of joint cartilage
- Inhibits cartilage degrading enzyme MMP (matrix metalloproteinase activity)
- Immune support
- Digestive support
Proteolytic Enzymes

• Moderates prostaglandin and arachidonic acid metabolism
• Help mediate temporary muscle soreness and joint discomfort associated with exercise
• Immune normalizing support

Ginger

• Promotes joint health and healthy inflammation through healthy cytokine signaling support
• Supports digestive comfort through stimulating digestive enzymes
• Cardiovascular support through maintaining healthy leukotriene and thromboxane production, and healthy platelet function
**MSM (Methylsulfonylmethane)**

- Source of organic sulfur, critical for maintaining healthy tissues
- Maintains connective tissue health
- Immune normalizing effect
- Inhibits pain impulses along nerve fibers
- Anti-inflammatory support

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**Stress Management and Inflammation**

- Chronic stress is a direct contributor to inflammation
- Prolonged stress alters the effectiveness of cortisol to regulate the inflammatory response because it decreases tissue sensitivity to the hormone.
- Immune cells become insensitive to cortisol's regulatory effect. In turn, runaway inflammation is thought to promote the development and progression of many diseases.
Stress Management and Inflammation

• Higher amounts of psychological stress and depression are linked with elevated CRP and IL-6 levels
• Anxiety disorders are characterized by a heightened inflammatory response and hypertension
• Poor sleep is lined to elevated inflammatory markers
• Lack of down time—always on computer, always checking cell phone, social media, etc. linked to inflammation
• Lack of nature time. Studies have shown people who live closer to or spend time in “green area’s” tend to have lower levels of stress.


Poor Acute Stressor/Chronic Stress Ratio

• We handle acute stressors far better than repeated, sustained stress—its how we are designed
• Like exercise, our bodies are designed to handle mental and emotional stress in acute, episodic ways.
• Balancing intense periods of focused work with brief periods of rest and repair is the key to managing the chronic stress response

Power of Full Engagement, Tony Schwartz, Jim Loehr
Stress Management Techniques

- Do not over-commit
- Learn to say no
- Meditation
- Prayer
- Breathing Exercises
- Practice the Art of Silence
- Get out in nature
- Move! Stop being sedentary
- Yoga

- Tai chi
- Adequate sleep
- Mini breaks throughout the day - balance stress & Recovery

Gut Health

https://www.researchgate.net/publication/221873645_Influence_of_Mindfulness_Practice_on_Cortisol_and_Sleep_in_Long_Term_and_Short_Term_Meditators
The Gut Microbiome

• Ecosystem of microorganism's including bacteria, viruses, protozoa, fungi
• Over 100 trillion friendly bacteria in our bodies
• Hundreds of unique species
• Modifier of disease
• Source of genetic diversity and influence

• The food you eat, determines the bacteria you grow, which will turn off and on certain genes
• Influencer of metabolism and physiology
• 80% of Immune cells come from the gut- essential component of immunity
• 90% of serotonin made in the gut, less than 10% in brain
• A source of systemic inflammation

Gut Health and Inflammation

Dietary challenges to the digestive tract, thus resulting in inflammation include:
1. Food intolerances
2. Low Fiber
3. Hard to digest proteins and “anti-nutrients”
4. Grains
5. Low in variety
6. Refined sugars
7. GMO’s and Pesticides
Gut Health and Inflammation

Medication challenges to the digestive tract, thus resulting in inflammation include:
1. Antacids
2. NSAID’s
3. Antibiotics
4. Corticosteroids
5. Oral contraceptives

Gut Health and Inflammation

Stress reaction challenges to the digestive tract, thus resulting in inflammation include:
1. Spasms
2. Increase acid secretion
3. Influence inflammation
4. Reduce immunity
Final Thoughts

- Inflammation can be both good and bad to our health and wellness
- Inflammation is the root and influencer to many illnesses and states of disease
- Lifestyle management is the best way to prevent, and offers many options in treatment of inflammation
- Balancing inflammation is a multiple factor process, including diet, stress management, exercise, relaxation, medication and nutritional therapy.
- As health care providers we sit in the perfect position to guide our patients and educate them on inflammation balance