



Culinary Medicine and Nature: Foods That Work Together

Abstract: *Culinary medicine is a new evidence-based field in medicine that blends the art of food and cooking with the science of medicine. Intended to be of constructive use to clinicians, patients, and families, this column covers 10 practical ways for eaters to enjoy preparing and choosing foods, meals, and beverages that work to prevent and treat disease and to enhance one's own natural ability to stay and get well. The column also identifies mechanisms by which food and beverages work in the body as culinary medicine. The column identifies what-to-look-for "chef's secrets" for choosing fruits and vegetables at the peak of flavor in your own garden, in supermarkets, and in farmer's markets. Edible flowers, herbs, and spices with special culinary medical value are also described, as are essential ways to choose and also, when necessary, avoid them. Finally, the corporate and professional office is described as an ideal site for nature-based stress reduction and burnout reversal, in which both culinary medicine and the power of nature can be used to reduce the symptoms associated with chronic stress.*

Keywords: culinary medicine; food as medicine; cooking; bioavailability; specific diets; nature therapy; nature as medicine; gardening; farmers

market; edible flowers; healthy recipe; ChefMD; horticulture; xenohormesis; burnout

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food and cooking with the science of medicine. Culinary medicine is aimed at helping people reach good personal medical decisions about accessing and eating high-quality meals that help prevent and treat disease and restore well-being. The objective of culinary medicine is to attempt to empower the patient to care for herself or himself safely, effectively, and happily with food and beverage.¹

In this column, I will cover several practical ways to enjoy culinary medicine in your kitchen, garden, food market and office.

Kitchen

A core principle of culinary medicine is bioavailability.² Like in pharmacology, nutrient bioavailability in food is influenced by many factors:(for example, cofactors, temperature, cooking method). Here are 10 take-

aways about bioavailability you can use now.

1. Combine leafy greens and avocado for seven times as much lutein absorption than if there was no avocado.³
2. Combine olive oil and tomatoes (or better, tomato paste) for more lycopene absorption⁴: tomato paste has 10 times the lycopene, gram for gram, as do tomatoes, but only 25% of lycopene is absorbed without fat.
3. Add two teaspoons of vinegar to a high carb meal to reduce the coming spike in blood sugar, insulin, and

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triglycerides by 20%, all within an hour.⁵

4. Add 11 walnuts before or during consumption of a processed meat and cheese dish to reverse brachial artery stiffening within four hours, perhaps from the walnuts' arginine, and its conversion to intravascular nitric oxide.⁶
5. Combine foods of the same color in the same dish to create better flavors: for example, butternut squash and yellow curry; more than one green herb in a salad or frittata; and red tomatoes with red bell peppers in a ratatouille.
6. Eat turmeric-containing dishes with both a tiny sprinkle of black pepper and a few drops of a healthy fat to improve the bioavailability of curcuminoids; the black pepper's piperine inhibits the liver's metabolism of curcuminoids, and the fat helps you absorb curcumin through lymphatics.^{7,8}
7. Leave the watermelon on the kitchen counter: watermelon then has 40% more lycopene and 139% more beta carotene than watermelon stored in the fridge, as carotenoid biosynthesis is affected by temperature.⁹
8. Lower heterocyclic amine (HCA) formation by 77% by marinating your (animal) meat burgers in a rosemary-containing marinade: the antioxidants rosmarinic and carnosic acids and carnosol in rosemary may inhibit HCA production.¹⁰
9. Let the garlic you chopped rest for 10 minutes before cooking it, to allow its allicin and thiosulfinate levels to rise, so you get their antiplatelet aggregation benefits.¹¹
10. Add a little bit of a fresh brassica (e.g., broccoli, kale, watercress, cauliflower) vegetable to a cooked or previously frozen brassica dish to reactivate the detoxification effects of the also cooked sulforaphane and boost it in the finished dish.^{12,13}

Garden

Gardening is rarely covered in a medical journal, but like cooking, there

is evidence for gardening's positive effects on health^{14,15} and for plants' synergistic effect on one another. For example, intercropping systems can work to improve growth, protect against pests, and improve yield.¹⁶

Higher quality gardening and farming yield higher quality fruits and vegetables, giving rise to something every good cook knows: the less you cook something that is truly fresh and well-grown, the better it tastes.¹⁷ From a culinary medicine perspective, minimally cooked produce from the garden often has a high nutrient content: for example, bell peppers' vitamins, minerals, and phytonutrients rapidly erode with any cooking.¹⁸

To try growing yourself, grow radishes—perhaps the easiest vegetable to grow—even in a window box. Harvest and put out a bowl of freshly washed radishes with their edible greens, as an appetizer, next to doctored-up hummus or the latest nut-cheese. If Alice Waters and Dan Barber can proudly feature radishes, so can you.

Market

Optimal food growing and buying is sometime challenging. Buying local, organic, and from a grower you know is an ideal and a privilege. Knowing a farmer who covers crops annually to improve food quality and care for the earth is a privilege too. Growing some of your own food helps you remember the cycle of the seasons, appreciate the connection between growing and nutrition, be mindful of food waste and insecurity, and enjoy the satisfaction and beauty of tactile, productive, creative, healthful time outdoors.

Unfortunately, most farmers are not growing optimally, most eaters are not buying optimally, and neither can. The demands of society, work, family, markets, and many other factors make it impossible at the moment, though I believe that will change in some groups, especially among the well-informed. So what to do at the market?

In the grocery store (or farmer's market), use your five senses. Try not to buy produce already wrapped in plastic or a box. A fruit you can eat in the next few days will have two of these three characteristics: it will be heavy in your hand for its size; it will have a slight give; it will be fragrant. Most common fruit (except citrus and most apples) should be firm with a slight give, but not rock hard or very soft. Most common ripe fruit is fragrant (except citrus, persimmons, and pomegranates). Don't use your finger or fingernail to test ripeness—it injures the fruit, and does not tell you what you want to know.

Take avocados, for example. Avocados are ripe when they are heavy in your hand for their size, and give just slightly to a gentle squeeze from your palm. They are not fragrant. An avocado's skin color when ripe is avocado specific: Hass and Lamb Hass darken; Macarthur, Fuerte, Rincon, and Bacon stay green. The best value in the market are blemished avocados that meet the aforementioned criteria. If you are in the mood for a uniform exterior, look for larger, just picked, not-yet-ripe avocados: they often have a better flesh to pit ratio than the small ones. Avocados with soft or dark spots are often fine to eat, once those spots are cut out and composted. Those fruit with cuts through the skin, mold, or squishiness, however, should be composted straightaway.¹⁹

For vegetables, I also like ugly, as long as the skin is not broken. I like heavy for size vegetables which are fragrant, full or turgid when appropriate. Generally, uniformly sized peppers, eggplants, squash, and many other vegetables have had real flavor bred out of them and "shipability" bred into them. Tomatoes (and many other fruits—famously bananas) also have been gassed with ethylene on their way to market to fool you into thinking they are ripe because their color matures.

Look for outsider, misshapen, colorful vegetables. One theory about why they are better for you than perfect exteriors is xenohormesis²⁰: i.e. those with benefiting from the stress of plants. Plants that have sent out anti-invader signals carry them to

the market and in their cells. And those plants are not pretty. Do not buy pretty. If you care about flavor you usually will not find it there, but you will find higher levels of anti-stress compounds²¹, which are often highly flavorful.

Here are more market “secrets”:

- An eggplant cap should be green in most varieties, not brown, yellow, or absent.
- The corn tassel should be black, and the husk filled out (no reason to rip it all the way open: just feel along its length).
- Strawberries should not be white or green at all, and should have their tops attached.
- Look for fresh basil with fleshy leaves and thin stems so it can do triple duty: as a garnish; a salad green like spinach; and as textural crunch. Texture, like acidity, is often the missing component of greatness in an otherwise good dish.

Edible Herbs

Herbs in cooking are leaves, and spices are every other part of the plant, including flowers. Everyone knows that you eat the leaves of a lettuce plant and the beans of a chickpea plant, but did you know that the flowers of many vegetables and herbs are also edible? (Common exceptions: flowers of tomato, potato, eggplant, peppers). The nutritional value of flowers is substantial, with flavonols, anthocyanins, and many vitamins and minerals being concentrated in them.²²

Which flowers are edible? The list is long: all the allium family (leeks, chives, garlic, garlic chives, onion, shallot). All brassica, lettuce, and herb blossoms, from arugula to basil to chamomile to dill to za’atar and three dozen more. Most of these taste like a slightly more bitter, pungent version of the herb.²³ Borage blossoms are one of my favorites: they taste like cucumber. Nasturtium (*Tropaeolum majus* L.) blossoms are among the easiest to grow and best-studied.²⁴ The flowers are beautiful; you can eat and pickle the buds; and the

flavor of both flowers and buds is peppery. They have antimicrobial, antifungal, and expectorant effects. Try them sprinkled on salads or on a just out-of-the-oven pizza. Really.

A word to the wise: do not eat a weed or a flower growing out of your garden or lawn or someone else’s unless you know what it is and how it was raised. Flowers from a florist are often imported and sprayed with chemicals; roadside herbs and edible flowers in parks may have had the same treatment, plus petroleum and waste products.

Office

Could specific plants on your desk at work improve medical problems? Possibly.

In our 4-week multisite pilot program, we gave plants and sent inspirational texts to clinicians and executives. Those who selected air-cleaning plants and tried anti-inflammatory herbs and spices had significantly better scores on the Perceived Stress Score (PSS-10) and Maslach Burnout Inventory (MBI) than they did at the start, improving back pain, depression and palpitations, among other stress-related symptoms. ($P < .05$; unpublished data). Was this culinary medicine at work?

We do not know a fraction of why nature and food work as medicine, but we do know what often works to prevent and treat common chronic diseases. The scientific evidence for both nature therapy^{25,26} and culinary medicine²⁷ is accumulating. Finding more of what nature and food have to offer to patients and clinicians is a path ahead.

Recipe

Here is a vegetarian recipe that you could make vegan with nutritional yeast and toasted sesame seeds instead of feta, or omnivorous by adding marinated roasted chicken thighs. Also, dried cherries may replace the cranberries, and small baby carrots may replace the cauliflower.

This recipe illustrates some of the principles mentioned above: the olive oil helps you absorb the carotenoids in the

cranberries and Brussels sprouts; the raw Brussels sprout helps you detoxify more efficiently; the fiber in the recipe helps you feel satiated—full and fully satisfied.

Roasted Winter Vegetables With Cranberry Studded Quinoa

Preparation time: 10 minutes

Cooking time: 20 minutes

4 servings

359 calories per serving, 31% from fat

Ingredients. 1-1/2 cups low-sodium vegetable broth

3/4 cup organic mixed color quinoa

1/4 cup dried sweetened cranberries

3 cups cauliflower florets, quartered (10 ounces)

8 ounces small Brussels sprouts, halved lengthwise, with one reserved and sliced thin

3 tablespoons virgin olive oil

1/2 teaspoon each salt and freshly

ground black pepper

1/4 cup organic barbecue sauce

8 ounces organic extra firm tofu, drained and cut into 3/4-inch cubes

1/2 cup toasted pumpkin seeds

1/2 cup crumbled feta cheese (optional)

Preparation. Heat oven to 450°F. Bring the broth to a boil in a medium saucepan. Stir in quinoa and cranberries. Reduce heat; cover and simmer 15 minutes or until most of liquid is absorbed. Turn off heat; let stand covered 5 minutes.

Meanwhile, arrange cauliflower and Brussels sprouts on a 15 × 10-inch jelly roll pan or baking sheet with sides. Drizzle oil and sprinkle pepper over vegetables; toss well to coat and sprinkle with salt and pepper. Bake 12 to 14 minutes or until the vegetables are browned on the bottom and crisp-tender. Transfer to a large bowl. Add barbecue sauce and reserved Brussels sprout; toss well. Add tofu; toss lightly. Spoon cooked quinoa mixture onto 4 serving plates; top with vegetable mixture and pumpkin seeds, and feta cheese if desired.

Nutritional Analysis per Serving.

Total fat (g) 17.0

Fat calories (kcal) 153

Cholesterol (mg) 12.6
Saturated fat (g) 3.5
Polyunsaturated fat (g) 1.9
Monounsaturated fat (g) 4.4
Fiber (g) 6.9
Carbohydrates (g) 49.8
Sugar (g) 16.6
Protein (g) 17.9

This recipe is adapted from Roizen M, La Puma J. *Cooking the RealAge Way*. New York, NY: HarperCollins; 2003.

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Informed Consent

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Trial Registration

Not applicable, because this article does not contain any clinical trials. **AJLM**

References

- La Puma J. What is culinary medicine and what does it do? *Popul Health Manag*. 2016;19:1-3. doi:10.1089/pop.2015.0003
- La Puma J, Marx RM. *ChefMD's Big Book of Culinary Medicine*. New York: Crown; 2008.
- Brown MJ, Ferruzzi MG, Nguyen ML, et al. Carotenoid bioavailability is higher from salads ingested with full-fat than with fat-reduced salad dressings as measured with electrochemical detection. *Am J Clin Nutr*. 2004;80:396-403. doi:10.1093/ajcn/80.2.396
- Fielding JM, Rowley KG, Cooper P, O'Dea K. Increases in plasma lycopene concentration after consumption of tomatoes cooked with olive oil. *Asia Pac J Clin Nutr*. 2005;14:131-136.
- Ostman E, Granfeldt Y, Persson L, Björck I. Vinegar supplementation lowers glucose and insulin responses and increases satiety after a bread meal in healthy subjects. *Eur J Clin Nutr*. 2005;59:983-988.
- Cortes B, Núñez I, Cofán M, et al. Acute effects of high-fat meals enriched with walnuts or olive oil on postprandial endothelial function. *J Am Coll Cardiol*. 2006;48:1666-1671.
- Shoba G, Joy D, Joseph T, Majeed M, Rajendran R, Srinivas PS. Influence of piperine on the pharmacokinetics of curcumin in animals and human volunteers. *Planta Med*. 1998;64:353-356.
- Anand P, Kunnumakkara AB, Newman RA, Aggarwal BB. Bioavailability of curcumin: problems and promises. *Mol Pharm*. 2007;4:807-818.
- Perkins-Veazie P, Collins JK. Carotenoid changes of intact watermelons after storage. *J Agric Food Chem*. 2006;54:5868-5874.
- Tsen SY, Ameri F, Smith JS. Effects of rosemary extracts on the reduction of heterocyclic amines in beef patties. *J Food Sci*. 2008;71:C469-C473.
- Cavagnaro PF, Camargo A, Galmarini CR, Simon PW. Effect of cooking on garlic (*Allium sativum* L.) antiplatelet activity and thiosulfates. *J Agric Food Chem*. 2007;55:1280-1288.
- Ghawi SK, Methven L, Niranjana K. The potential to intensify sulforaphane formation in cooked broccoli (*Brassica oleracea* var. *italica*) using mustard seeds (*Sinapis alba*). *Food Chem*. 2013;138:1734-1741.
- Dosz EB, Jeffery EH. Modifying the processing and handling of frozen broccoli for increased sulforaphane formation. *J Food Sci*. 2013;78:H1459-H1463.
- Soga M, Gaston KJ, Yamaura Y. Gardening is beneficial for health: a meta-analysis. *Prev Med Rep*. 2016;5:92-99. doi:10.1016/j.pmedr.2016.11.007/
- Mie A, Andersen HR, Gunnarsson S, et al. Human health implications of organic food and organic agriculture: a comprehensive review. *Environ Health*. 2017;16:111. doi:10.1186/s12940-017-0315-4
- Mt. Pleasant J. Food yields and nutrient analyses of the three sisters: a haudenosaunee cropping system. *Ethnobiol Lett*. 2016;7:87-98. doi:10.14237/ebl.7.1.2016.721
- Madison D. *Vegetable Literacy Cooking and Gardening With Twelve Families from the Edible Plant Kingdom, With Over 300 Deliciously Simple Recipes*. New York, NY: Penguin/Random House; 2013.
- Jiménez-Monreal AM, García-Diz L, Martínez-Tomé M, Mariscal M, Murcia MA. Influence of cooking methods on antioxidant activity of vegetables. *J Food Sci*. 2009;74:H97-H103.
- La Puma J. The care and feeding of an avocado. *Edible Santa Barbara*. 2019;43:50-54.
- Howitz KT, Sinclair DA. Xenohormesis: sensing the chemical cues of other species. *Cell*. 2008;133(3):387-391. doi:10.1016/j.cell.2008.04.019
- Slather A, Mikulic-Petkovsek M, Halbwirth H, Stampar F, Stich K, Veberic R. Polyphenol metabolism of developing apple skin of a scab resistant and a susceptible apple cultivar. *Trees* (2012) 26:109. https://doi.org/10.1007/s00468-011-0577-3
- Lu B, Li M, Yin R. Phytochemical content, health benefits, and toxicology of common edible flowers: a review (2000–2015). *Crit Rev Food Sci Nutr*. 2016;56(Suppl 1):S130-S148. doi:10.1080/10408398.2015.1078276.
- MacAller M. *Spice Health Heroes: Unlock the Power of Spice for Flavour and Wellbeing*. London, England: Jacqui Small; 2016.
- Klimek-Szczykutowicz M, Szopa A, Ekiert H. Chemical composition, traditional and professional use in medicine, application in environmental protection, position in food and cosmetics industries, and biotechnological studies of *Nasturtium officinale* (watercress) – a review, *Fitoterapia* 2018; 129: 283–292.
- La Puma J. Nature therapy: an essential prescription for health. *Alternative and Complementary Therapies* 2019; 25 (2): 68-71. https://doi.org/10.1089/act.2019.29209.jlp
- Twohig-Bennett C, Jones A. The health benefits of the great outdoors: a systematic review and meta-analysis of greenspace exposure and health outcomes. *Environ Res*. 2018;166:628-637. doi:10.1016/j.envres.2018.06.030
- Irl BH, Evert A, Fleming A, et al. Culinary medicine: advancing a framework for healthier eating to improve chronic disease management and prevention. *Clin Ther*. 2019;41:2184-2198. doi:10.1016/j.clinthera.2019.08.009