

The Calorie-Restricted Diet

What is the calorie-restricted diet?

The calorie-restricted diet (CR) is an eating pattern that involves reducing food intake by 20-40% of daily caloric requirements while meeting the requirements of essential nutrients. Calories are the body's basic source of energy obtained from the three macronutrients found in food, namely carbohydrates, fats, and proteins. Long-term CR has historically been followed by populations such as the Okinawans of Japan and more recently by proponents of Calorie Restriction with Optimal Nutrition (CRON).

What are the health benefits of CR?

Research has highlighted a number of health benefits associated with the calorie-restricted diet, including:

- Weight loss
- Improved cardiometabolic markers (e.g., C-reactive protein, blood pressure, LDL cholesterol, triglycerides, and total cholesterol levels)
- Improved glucose metabolism
- Improved cognitive function
- Reduced risk of chronic conditions (e.g., cancer, cardiovascular disease, type 2 diabetes)
- Improved biomarkers of aging (e.g., oxidative damage, fasting insulin levels, core body temperature)

How does CR work?

The health benefits of CR may be attributed to a number of physiological changes, including:

- Increased autophagic mediators involved in recycling dysfunctional components of the cell
- Downregulation of genes involved in oxidative stress
- Reversed telomere erosion, one of the cellular markers of aging
- Generation of new mitochondria, the energy-producing structures inside the body's cells
- Improved effectiveness of the ubiquitin-proteasome system, a cellular process which removes damaged proteins from cells

Overview of the Calorie-Restricted Diet

Calorie intake should be 20-40% less than daily caloric requirements. CRON participants typically consume approximately 1,100 to 2,300 kcal/day, based on specific individual needs.

The table below outlines the estimated daily energy requirements for various populations and the daily caloric intake to achieve 20%, 30%, and 40% CR.

Population	Estimated Energy Requirement*	20% CR	30% CR	40% CR
Males 18-25	2,800	2,240	1,960	1,680
Males 26-45	2,600	2,080	1,820	1,560
Males 46-65	2,400	1,920	1,680	1,440
Males 66 and up	2,200	1,760	1,540	1,320
Females 18	2,000	1,600	1,400	1,200
Females 19-25	2,200	1,760	1,540	1,320
Females 26-50	2,000	1,600	1,400	1,200
Females 51 and up	1,800	1,440	1,260	1,080

*USDA estimated energy requirement for moderately active individuals

An online calorie counter app can be a useful tool for tracking daily caloric intake. Examples of calorie counter apps available for both Android and iOS devices include:

- MyFitnessPal
- Fooducate
- Lifesum
- Jawbone UP
- My Diet Coach
- Fitbit built-in calorie counter

Calorie-Restricted Diet Food List

While CR does not strictly restrict the intake of particular foods, the diet generally focuses on nutrient-dense, low-calorie foods. The table below provides examples of common foods to limit and nutrient-dense, lower-calorie alternatives to favor.

Food Group	Avoid	Moderate	Enjoy
Carbohydrates	High-glycemic and processed food and drinks (e.g., refined carbohydrates, sugar, alcohol, soda)	n/a	Whole grains Beans and legumes
Dairy	Processed dairy products (e.g., processed cheese slices, evaporated milk)	High-fat dairy (e.g., cream, butter, cheese)	Low-fat dairy (e.g. skim milk, non-fat yogurt or cottage cheese)
Vegetables	n/a	n/a	Leafy greens, all vegetables, and culinary herbs
Fruits	n/a	High-glycemic fruit (e.g., bananas, mangoes, figs, dried fruit)	Low-glycemic fruit (e.g., berries, peaches, citrus, avocado)
Proteins	Processed meats (e.g., cold cuts, hot dogs, canned meat)	Fatty meat (e.g., bacon, sausages, duck, fatty cuts of pork or beef) Egg yolks	Beans, soy (e.g., edamame, tempeh, tofu), Egg whites Fish and lean meat (e.g., chicken, turkey, red meat with fat trimmed)
Fats	Trans-fatty acids (e.g., vegetable shortening, margarine, certain baked goods) Fried foods (e.g., chips, fries, donuts, onion rings)	Saturated fat (e.g., lard, cream, butter, animal fat)	Omega-3 fatty acids (e.g., fish, chia, flax seeds) Monounsaturated fat (e.g., olive oil, nuts, seeds, avocado)

Caution

Extreme CR without adequate nutrition can be harmful. The calorie-restricted diet should be followed under the supervision of your integrative healthcare practitioner to ensure that nutrient requirements are met. Some side effects of this diet include increased sensitivity to cold, loss of libido, extreme leanness, and impaired menstrual cycles. Exercise may also mediate the adverse effects of long-term CR in older adults, such as a reduction in lean muscle mass and bone density.