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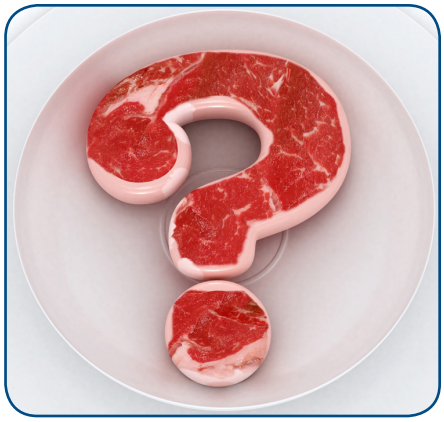
University of California, Davis, Department of Nutrition and the Center for Nutrition in Schools

New Guidelines on Red and Processed Meat Serve Confusion

A recent slate of articles published in the *Annals of Internal Medicine* has generated much discussion and controversy in the nutrition and public health sphere (1-5). The articles include four systematic reviews and meta-analyses, which were then used by an international group of scientists referred to as Nutritional Recommendations (NutriRECS) consortium to develop recommendations regarding red meat and processed meat consumption. The controversy stems from conclusion made by the NutriRECS consortium—that adults should continue the levels of red and processed meat they currently consume (1). The recommendations from the consortium, which bills itself as bringing rigor to nutrition recommendations, run counter to those made by the World Health Organization, the Dietary Guidelines for Americans, other prominent guidelines, as well as the findings of three of their own systematic reviews. Dozens of scientists have signed a letter to the editor questioning the methods and conclusions (6). Responses to the paper have been published by prominent researchers, universities, and other organizations (7-9).



To understand the controversy, a closer look at the process and methods used to generate these recommendations is needed. As explained in the guidelines they issued, the consortium undertook four systematic reviews and meta-analyses to look further into the question of whether red and processed meat negatively impact health and one review to examine health-related beliefs and preferences surrounding red and processed

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The NutriRECS consortium recommended that individuals continue their current level of red and processed meat consumption, which was at odds with many of the systematic review findings.

meat. These articles were to form research basis on which they ground their recommendations.

The first of these reviewed randomized trials and the effects of red and processed meat intake on cardiometabolic and cancer outcomes, for which the authors identified twelve studies for inclusion. In particular, they were interested in those that reported on all-cause mortality and other major cardiovascular events (3). The authors identified two studies out of the initial 12 that included data on all-cause mortality, however they elected not pool the data and instead base much of the review findings on a single study. The second study was not pooled with the other data as the authors felt this study had too large of an effect size (10). This in particular has been highlighted as confusing (7), as has the exclusion of other randomized interventions such as the PREDIMED trial (6), which meets the inclusion criteria and also found positive effects of limiting red and processed meat as part of a Mediterranean eating pattern (11). Overall, the systematic review concluded that limiting consumption of red or processed meat has no impact on cardiometabolic and cancer outcomes.

Three other reviews examined cohort studies of red and processed meat consumption in relation to all-cause mortality and cardiometabolic outcomes (2), cancer mortality and incidence (4), and cardiometabolic and cancer outcomes (5). Cohort studies differ from randomized trials in that they do not assign participants to treatment groups, instead a cohort of participants is followed for a long period of time and then sub-groups within the cohort are compared based on factors of interest. In the first of these systematic reviews, the authors included 61 studies that collectively included over 4 million participants. They found that reducing red or processed meat by three servings per week was associated with decreases in risk for cardiovascular mortality, stroke, heart attack and type 2 diabetes, although the identified decreases were very small. In the second cohort study review,

Editor
Anna M. Jones, Ph.D..
Assistant Project Scientist

Associate Editor
Rachel E. Scherr, Ph.D.
Assistant Research Scientist

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The PREDIMED trial is an example of an intervention not included in the systematic review. This study examined the impact of a Mediterranean eating pattern on health outcomes.

which examined cancer specifically and included 118 articles, a reduction in 3 servings per week of red or processed meat was associated with decreases in cancer mortality, as well as reduced incidence of certain types of cancers. In the third review of cohort studies of cardiometabolic and cancer outcomes, the authors identified 105 studies that included over 6 million participants, although depending on the outcome of interest (e.g. incidence of certain types of cancer), the total sample sizes varied. Overall, the review concluded that dietary patterns with less red or processed meat are associated with slightly lower risk for nonfatal stroke, type 2 diabetes, and overall cancer incidence and mortality.

As other scientists have noted, the quality assessment tool used by the systematic reviews that served as the basis for recommendations automatically downgrade observational studies and emphasize randomized controlled trials. On the surface, this seems reasonable; it is more difficult to establish a causal relationship with cohort studies. However, it also ignores the complex nature of nutrition research and timeframe required for the development of heart disease and cancer. As a result, the reviews and recommendations minimize the importance of observational studies in establishing health benefits or risks associated with nutrition behaviors. In one instance, while their own criteria indicated an observational study should be upgraded due to evidence of a dose-response relationship, they declined to do so, stating the relationship may be due to other dietary factors (2).

Despite these inconsistencies, all three of the cohort study systematic reviews found a benefit to reducing red and processed meat consumption (2,4,5). Because the panel determined the evidence to be low-certainty and framed their recommendations as being targeted toward individuals who are unlikely to be interested in small risk reductions, they concluded that adults should continue their current consumption of red and processed meat. Findings from an additional systematic review that concluded that most would be unwilling to give up meat were also factored into the guidelines the

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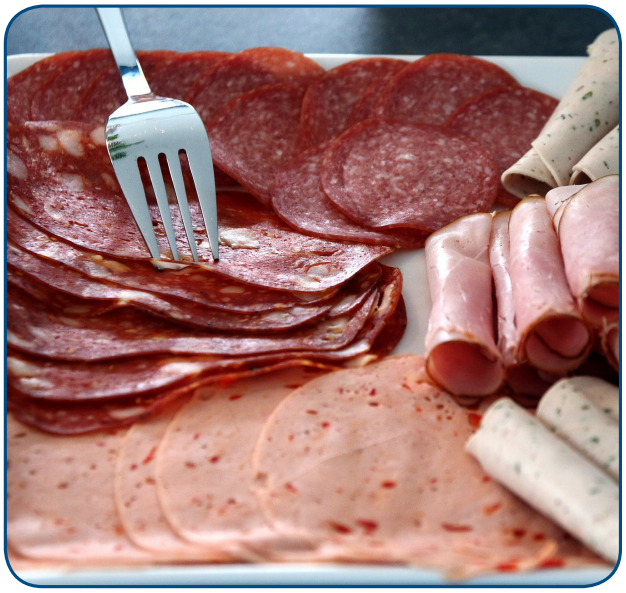

All three of the cohort study systematic reviews found a benefit to reducing red and processed meat consumption.

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consortium issued (12). However, when expanding the small reductions in risk to the US population of over 300 million it can mean the prevention of tens of thousands of premature deaths from chronic disease.

Overall, while there is a logical basis to the recommendations issued by the consortium, the takeaway should not be that red and processed meat consumption are benign, or that there should be more rigor in health recommendations. Rather, these guidelines highlight the need for research funding for randomized controlled studies.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

Light Physical Activity May Reduce Risk of Mortality

This meta-analysis found that light physical activity is effective at reducing risk of early death.

You may have heard that moderate and vigorous physical activity are important for maintaining health, but it turns out that light physical activity may be better at reducing risk of all-cause mortality than previously thought. A recent meta-analysis published in the *British Medical Journal* found that all intensities of physical activity, including light, were effective at reducing risk of early death (1).

Much of the research available has focused on moderate and vigorous physical activity. For this reason, the Physical Activity Guidelines for Americans only issue recommendations for moderate-to-vigorous (60 minutes each day for children and 150 minutes per week for adults). Studies have also largely relied on self-report, which are often focused on leisure activities, can be subject to problems with being able to recall activities, and may be vulnerable to social desirability biases causing participants to over-report because they feel that they should be more active than they are.

To avoid these types of issues, the meta-analysis looked specifically at studies using accelerometers. These devices are worn on the body and can detect when physical activity is taking place as well as intensity of the activity. In addition to using accelerometers to determine individual-level physical activity, studies that were eligible for inclusion were those that had data on all-cause mortality. The researchers were able to identify eight studies to include in the meta-analysis. The data from these studies were then pooled together and analyzed to determine the impact of different intensities and amounts of physical activity on all-cause mortality.

By categorizing the data into four quarters, from least active (first quarter) to most active (fourth quarter), the researchers found that compared to the least active group, any level of physical activity reduced the risk of death. They also found that the magnitude of risk reduction was the greatest for the second group. While increasing levels of physical activity were associated with increasingly lower risk, the biggest drop in risk was between the first quarter than the second. For example, in the second quarter, which was the second least active, physical activity was associated with 52 percent lower risk of all-cause mortality, while in the third quarter, it was

Physical Activity *Continued on Page 6*

The current Physical Activity Guidelines for Americans issue recommendations for moderate-to-vigorous physical activity.

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associated with 65 percent lower risk, and 73 percent lower risk in the fourth quarter, the most active group. Also of note in this meta-analysis was the finding that light intensity activity had a large impact in reducing risk. Within quarter 2, light physical activity was associated with a 40 percent reduction in risk.

These data demonstrate that any level or intensity of physical activity is beneficial to health. This may be encouraging to those who are not physically capable or find moderate-to-vigorous activity to be daunting.

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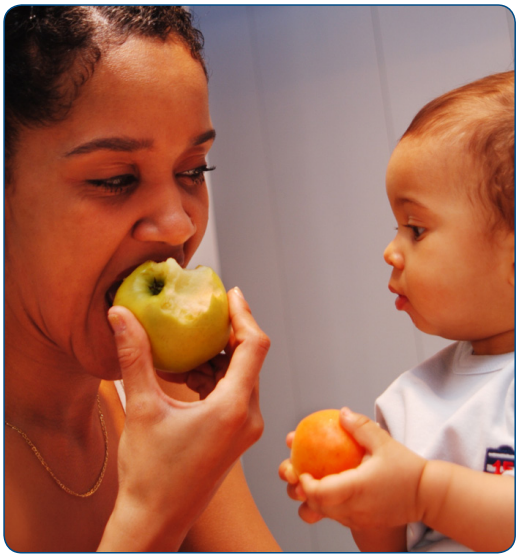
By Anna M. Jones, Department of Nutrition, University of California, Davis.

Progress Made in Improving Diet Quality, Still a Long Way to Go

Recent research suggests that between 1999 and 2016, dietary intake for adults in the US improved (1). In a study published in *JAMA*, researchers analyzed 17 years of data including over 40,000 adults (n = 43,996) from the National Health and Nutrition Examination Survey (NHANES). Using this large national survey, which gathers data on the health and nutritional status of Americans, the researchers examined the proportion of calories that were consumed from different food groups, as well as the food sources of these groups. In addition, they analyzed overall diet quality using the Healthy Eating Index 2015 (HEI), which measures how well an individual's diet aligns with the recommendations of the 2015-2020 Dietary Guidelines for Americans.



Overall, adults were consuming more of their calories from whole grains and fruit in 2016 compared to 1999.

They found that adults had shifted their proportion of calories from carbohydrates, protein, and fat. Over time, adults consumed a smaller proportion of their calories from carbohydrates, going from 52.5 percent in 1999 to 50.5 percent in 2016. Americans were also found to be consuming more of their calories from protein (15.5 percent in 1999 versus 16.4 in 2016) and fat (32.0 percent in 1999 to 33.2 percent in 2016).

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While the total proportion of calories from carbohydrates declined, the proportion from high-quality carbohydrates, such as whole grains and fruit) increased from 7.42 percent to 8.65 percent, while the proportion of calories from low-quality carbohydrates, such as added sugar, declined from 45.1 percent to 41.8 percent. They were also found to be consuming a larger proportion of their calories from protein from sources such as whole grains, nuts, and soy foods. Overall, added sugar consumption decreased from 16.4 percent of calories to 14.4 percent of calories. This decrease in added sugars contributed to the observed increase of HEI scores, from 55.7 to 57.7.

While the researchers were able to detect improvements, the average diet was still well below recommendations for vegetables, fruits, and whole grains.

The researchers also analyzed different population subgroups to determine if these improvements varied by age, education, and income. While there were declines in low-quality carbohydrates and increases in high-quality carbohydrates and protein across all subgroups, the researchers found that greater improvements were in those who were younger, more educated, or had higher incomes.

Despite these increases, consumption still falls short of recommended amounts. For example, while added sugar consumption has declined, it is still much higher than the 10 percent of calories recommended by the Dietary Guidelines for Americans. The improvements were experienced disproportionately in those who have higher incomes and education levels; to address this, the researchers suggested that future interventions should focus on eliminating these disparities. The improvement in HEI scores was quite also small, and the researchers noted that it may not translate to improvements in health.

Between 1999 and 2016, adults consumed fewer calories from added sugar.

While it is clear that there is a long way yet to go, the changes in the American diet between 1999 and 2016 demonstrate that progress is being made.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

Maternal Lead Levels Associated with Child Overweight and Obesity, Folate May Attenuate the Effects

A new study published in *JAMA Network Open* further highlights the importance of folate during pregnancy. This study found that while maternal blood levels of lead are associated with childhood risk of overweight or obesity, folate status can attenuate some of that risk (1).

Paint containing lead was commonly used in homes built before 1978. Flaking lead paint can introduce lead into the home.

Mothers (n = 1,442) living in the Boston, MA area were recruited to participate in the study within a few days of giving birth, which allowed the researchers to determine blood lead levels and maternal folate status at that time. Since red blood cells live about 120 days, these blood samples served as a proxy for the mother's folate and lead levels during the third trimester. This period of pregnancy is thought to be critical regarding risk of childhood overweight and obesity (2). The researchers also gathered additional information from the mothers, including age, demographics, and pregnancy complications they may have experienced, in order to factor these into their analysis.

Child blood levels were then assessed during a routine well-child visit around 1 year of age and height and weight at subsequent well-child visits. Since the study enrolled mothers and children over a number of years (2002-2013), researchers used the latest information on child height and weight from routine well-child visits to determine Body Mass Index (BMI) and risk of overweight and obesity.

The third trimester is thought to be critical with regards to risk of childhood overweight and obesity.

The study found that lead was detectable in mothers in the study and the average maternal blood lead level was 2.5 µg/dL. The median blood lead level for children in the study was 1.4 µg/dL, which was associated with maternal blood levels; the child was more likely to have higher lead levels when their mother had higher blood lead. Maternal blood lead levels were also found to be associated with higher risk of childhood overweight and obesity. Interestingly, although maternal lead levels were associated with both child lead levels and risk of their child being overweight or obesity, child blood levels did not appear to impact risk of overweight or obesity.

Maternal overweight and obesity also seemed to play a role; children whose mother was overweight or obese and had blood levels of lead about 5 µg/dL were at the highest risk of childhood overweight and obesity.

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The researchers also found that maternal folate status may help mitigate that risk. In mothers who were overweight or obese and had high blood levels of lead, there was a 41 percent reduction in risk of childhood overweight and obesity if the mothers had adequate folate status.

However, the study did have several weaknesses that are important to note. The first is that they measured child lead as well maternal lead and folate at one time point each, which limits the ability to determine how changes over time may affect outcomes. The researchers also didn't assess child physical activity or food behaviors; as a result, these couldn't be factored into the analysis. Despite this, this research presents a possible new public health strategy to screen for and optimize folate status as a way to decrease the negative impacts of maternal lead exposure on children.

Green, leafy vegetables are a good source of folate, as are fortified grain products.

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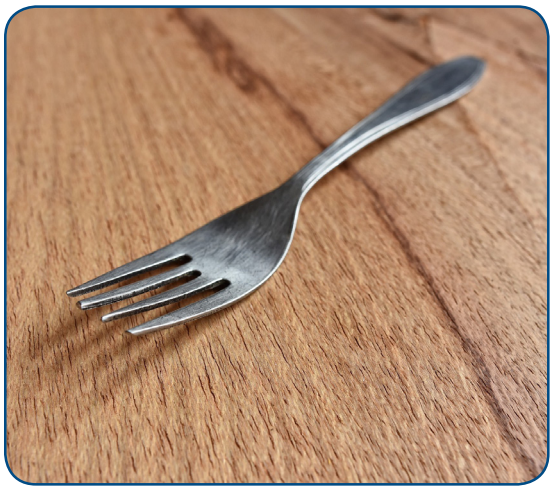
By Anna M. Jones, Department of Nutrition, University of California, Davis.

Nutritional Status in Older Adults Related to Self-Care Capacity, Food Insecurity, and Depression



New research from the University of Alabama suggests that self-care capacity may have an impact on food security as well as nutritional status in low-income older adults (1).

Self-care capacity is the ability to perform everyday tasks, such as grocery shopping, cooking, finding transportation, and financial management. The researchers hypothesized the self-care capacity would impact depressive symptoms as well as food insecurity, as it could impair ability to afford, obtain, and prepare food.

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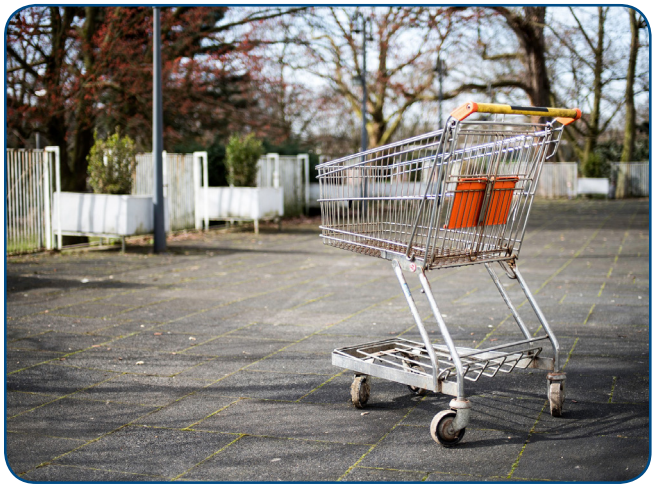
Nutritional Status (Continued from page 9)



Self-care capacity is the ability to perform everyday tasks, such as grocery shopping, cooking, finding transportation, and financial management.

The researchers recruited adults aged 60 years and older living in Alabama to participate in the study (n = 372). Participants filled out surveys regarding sociodemographic characteristics, food insecurity, depressive symptoms, and nutritional status. To assess self-care capacity, participants rated their ability to complete necessary self-care tasks on a scale of 0 (no help), 1 (some help), or 2 (complete help), which were then used to create a self-care capacity score.

Those with lower self-care capacity were more likely to have poor nutritional status as well as more likely to have depressive symptoms. In addition, those with depressive symptoms were also found to be more likely to have poor nutritional status. This suggests that self-care capacity impacts nutritional status directly as well as indirectly through depressive symptoms.

Interestingly, food insecurity didn't appear to directly impact nutritional status in this population; instead the relationship appeared to be mediated indirectly through depressive symptoms as those with food insecurity were more likely to score higher on the depression scale.

These results suggest that self-care, depression, and nutritional status are interconnected; greater impact in improving the nutritional status of seniors may be through a multi-pronged approach that addresses self-care capacity and depression in addition to providing food assistance.

The study had weaknesses. The first is that all participants were recruited in Alabama and the results may not be generalizable to other states or populations. Furthermore, study had a cross-sectional design; as a result, it is difficult to say if there is a causative relationship between the factors examined in this study. While more research is needed, the findings suggest a promising direction in reducing food insecurity as well as depressive symptoms through supporting self-care capacity.

Those with lower self-care capacity were more likely to have poor nutritional status as well as more likely to have depressive symptoms.

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By Anna M. Jones, Department of Nutrition, University of California, Davis.

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UCDAVIS

University of California, Davis

Nutrition Perspectives
Nutrition Department
One Shields Ave.
Davis, CA 95616

Phone:
530.752.3387

Nutrition Perspectives
University of California, Davis
Nutrition Department
One Shields Ave
Davis, CA 95616