

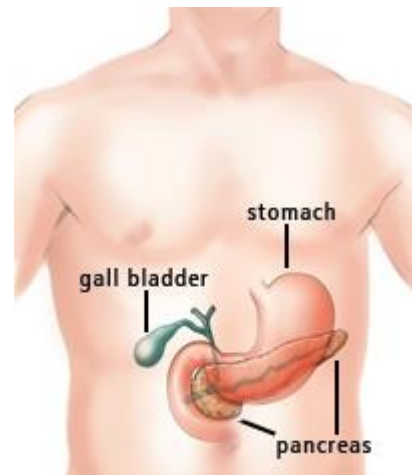
**Nutritional Guidelines for  
Individuals Diagnosed with  
Cancer of the Pancreas**

**Introduction**

Because the pancreas is not seen or felt in one's day to day lives, most people do not know as much about the pancreas as they do about other parts of the human body.

The pancreas is a glandular organ – part of both the digestive and endocrine systems. In humans, the pancreas is located in the abdominal cavity behind the stomach. It is an endocrine gland producing several important hormones, including insulin, glucagon, somatostatin, and pancreatic polypeptide which circulate in the blood.

[Picture Credit: Pancreas]



The pancreas is also a digestive organ, secreting pancreatic juice containing digestive enzymes that assist digestion and absorption of nutrients in the small intestine. These enzymes assist in further breaking down the carbohydrates, proteins, and lipids in the chyme. Chyme is the pulpy acidic fluid which passes from the stomach into the small intestine, consisting of gastric juices and partly digested food. (Wikipedia).

**The Importance of Good Diet and Nutrition**

Making the healthiest choices possible to maintain good nutrition can help patients minimise the side effects of treatment, recover from surgery and/or maintain the best quality of life. Pancreatic insufficiency is the inability of the pancreas to make or secrete the enzymes needed for digestion. Having an insufficient amount of pancreatic enzymes can cause digestive issues, and it is a very common problem for pancreatic cancer patients.

Pancreatic cancer affects the body's ability to digest and absorb vital nutrients from food. This can cause a variety of digestive problems. Over time, these digestive problems can put patients at risk for malnutrition.  
(Cancer Treatment Centers of America).

### **Pancreatic Enzymes**

Pancreatic enzymes help break down fats, proteins and carbohydrates. A normally functioning pancreas secretes about 2 000ml of pancreatic juice into the duodenum (small intestine), daily. This fluid contains pancreatic enzymes to help with digestion and bicarbonate to neutralise stomach acid as it enters the small intestine.

Enzyme	Function	Effect of Shortage
Lipase	Lipase works with bile from the liver to break down fat molecules so that it can be absorbed and used by the body	A lack of needed fats and fat-soluble vitamins. Diarrhoea and/or fatty stools.
Protease	Proteases break down proteins. They help keep the intestine free of unwanted organisms such as bacteria, yeast and protozoa.	Allergies or the formation of toxic substances due to incomplete digestion of proteins. Increased risk for intestinal infections.
Amylase	Amylase breaks down carbohydrates (starch) into sugars which are more easily absorbed by the body. This enzyme is also found in saliva.	Diarrhoea due to the effects of undigested starch in the colon (large intestine).

Some of the symptoms associated with pancreatic enzyme insufficiency include:

- feelings of indigestion
- cramping after meals
- large amounts of gas
- foul smelling gas or stools
- floating or greasy/fatty stools
- light-coloured, yellow or orange stools
- frequent stools
- loose stools
- weight loss

Patients with these symptoms should discuss with their medical team whether taking supplemental pancreatic enzymes may be beneficial for them.  
(Pancreatic Cancer Action Network).

### **Possible Side Effects of Taking Pancreatic Enzymes**

Some brands of pancreatic enzymes have a Medication Guide enclosed or provided by the pharmacist. If one is available, read the Medication Guide before taking this medication. Consult the treating doctor or pharmacist in case of any questions.

This medication is taken by mouth with meals and snacks as directed by the treating physician.

Diarrhoea, constipation, headache, abdominal pain, cramps, bloating, gas, dizziness, cough, nausea, or vomiting may occur. If any of these effects persist or worsen, inform the doctor or pharmacist promptly.

Remember that the doctor has prescribed this medication because he or she has judged that the benefit is greater than the risk of side effects. Many people using this medication do not have serious side effects.

Inform the doctor right away if any of these rare but very serious side effects occur: severe constipation, severe stomach/abdominal discomfort, frequent painful urination or joint pain.

Very serious allergic reactions to this drug are rare. However, seek immediate medical attention if you notice any symptoms of a serious allergic reaction, including: a rash, itching or swelling (especially of the face, tongue or throat), severe dizziness, trouble breathing. This is not a complete list of possible side effects. Kindly contact a doctor or pharmacist in the event of other effects not listed above.

### **Diabetes, Glucose Intolerance and Pancreatic Cancer**

About 80% of pancreatic cancer patients have glucose intolerance or frank diabetes. The early symptoms of pancreatic cancer, such as abdominal pain, weight loss, fatigue, jaundice, and nausea, are nonspecific and may occur late in the course of the disease. As a result, pancreatic cancer is usually diagnosed at an advanced stage, frequently after the tumour has already metastasised. Pancreatic cancer is insensitive to pharmacological and radiological intervention and often recurs after apparently curative surgery. All these factors contribute to the dismal prognosis of the disease.

The majority of diabetes associated with pancreatic cancer is diagnosed either concomitantly with the cancer or during the two years before the cancer is found; 71% of the glucose intolerance found in pancreatic cancer patients is unknown before the cancer is diagnosed. These suggest that recently-developed glucose intolerance or diabetes may be a consequence of pancreatic cancer and that recent onset of glucose intolerance or diabetes may be an early sign of pancreatic cancer.

Diabetes may be either a risk factor or a symptom of pancreatic cancer. Pancreatic cancer is more likely to occur in people who have long-standing (over 5 years) diabetes than in people who do not have diabetes. In pancreatic cancer patients who have had diabetes for less than five years, it is unclear if the diabetes contributed to the cancer or if the precancerous cells caused the diabetes.

Research studies suggest that new-onset diabetes in people over 50 may be an early symptom of pancreatic cancer. A sudden change in blood sugar levels in diabetics who previously had well-controlled diabetes may also be a sign of pancreatic cancer.

Cutting all forms of sugar out of the diet will not result in the death of cancer cells because cancer cells cannot be starved. Glucose is the basic food source for all cells, including cancer cells. In a person with cancer, metabolic changes can cause the body to break down body fat and lean body mass to make energy for both cancer cells and healthy cells. This is the case regardless of sugar intake. It may be necessary to avoid foods high in simple sugars if the individual experiences problems with watery diarrhoea after eating such foods. Foods high in simple sugars include rich desserts, ice cream, candy, sweetened drinks and fruits packed in syrup.

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If a patient is experiencing weight loss unrelated to blood sugar control, it may be caused by cancer induced weight loss, called cancer cachexia. In this situation, chemical changes in the body cause the breakdown of body fat and lean body mass to make energy for cancer and healthy cells. It may be necessary to introduce another supplement into the diet. Consult a doctor or registered dietitian to find out which supplement is right.

Individuals with diabetes and cancer have special nutritional needs. An individual can have a positive influence on his/her blood glucose and overall health by choosing foods wisely. By eating well-balanced meals, individuals can keep their blood glucose level as close to normal (non-diabetes level) as possible. The proper balance of nutrients from food, medication, physical activity and nutritional supplements is needed to improve blood glucose control, physical healing, weight maintenance and quality of life.

The body uses kilojoules from carbohydrates for energy and uses protein to build lean body mass. Choosing foods with complex carbohydrates, such as starch and fibre, may help in the control of blood glucose levels. Plant-based foods contain fibre that can help lower blood glucose and cholesterol levels. Foods high in fibre include: bran cereals, cooked beans and peas, whole-grain bread, fruits and vegetables.

Eating high-protein foods and small amounts of healthy fat with every meal and snack also may help control blood sugar levels. High-protein foods include: dried beans, peas, lentils, lean meats and low-fat dairy products. Foods high in healthy fats include: olive, canola and peanut oils, olives, avocados, nuts and seeds and fatty fish such as mackerel, lake trout, herring, sardines, albacore tuna and salmon.

When a patient is first diagnosed with pancreatic cancer, a thorough assessment is performed to identify comorbidities and issues that will help determine treatment strategy. Patients should be assessed for risk factors associated with the development of diabetes prior to the initiation of cancer therapy. These risk factors include age, obesity, family history of diabetes, history of gestational diabetes, and a previously abnormal fasting glucose or glucose tolerance test. If the patient has any of these risk factors, fasting glucose and HbA1c should be included in the initial blood work.

A patient with both diabetes and pancreatic cancer requires additional assessment so therapy can be selected based on careful consideration of the patient's glycaemic state. Oral hypoglycaemic agents (OHAs) are reviewed to determine whether the patient's renal or hepatic status precludes the use of the medication. Metformin or sulfonylureas should be substituted with another medication if renal insufficiency or significant hepatic impairment is present.

Pancreatic insufficiency from surgery and tumour cause abdominal pain, bloating, and diarrhoea, particularly after eating. Pancreatic insufficiency is the syndrome that results from a deficiency in pancreatic enzymes that are required to properly digest food. This also is a syndrome associated with T1DM and T2DM.

Gastrointestinal issues such as nausea, anorexia, and diarrhoea from pancreatic insufficiency will affect glycaemic control and, therefore, medications should be adjusted with each of these symptoms so that hypoglycaemia can be avoided.

Chemotherapy, including an appropriate antiemetic regimen, can increase the risk of hyperglycaemia as shown in the case study. Chemotherapy and supportive medications prepared in

dextrose and glucocorticoids certainly affect glycaemic state. Baseline blood glucose and close monitoring is required even if the patient is not a known diabetic. The comorbid conditions of pancreatic cancer and T2DM require two sets of interdependent goals, oncologic and glycaemic control. Both sets of goals are determined primarily by life expectancy. Glycaemic goals will be more liberal if the patient has an incurable cancer; oncologic goals will focus on prolonging quality of life. If the patient has a curable circumstance, glycaemic goals will be much tighter so that microvascular and macrovascular complications are minimised during and after cancer treatment. Other factors that affect glycaemic goals include patient motivation, risks associated with hypoglycaemia, duration of T2DM, other comorbidities, presence of vascular complications, and presence of adequate family and financial support.

(Wang, *et al.*, 2003; Pancreatic Cancer Action Network; Medscape).

### **Eating Tips Before, During and After Cancer Treatment**

There is no way to know if one will have eating problems and, if so, how bad they will be. One may have just a few problems or none at all. In part, this depends on the type of cancer one has, where it is in one's body, what kind of treatment one has, how long treatment lasts, and the doses of treatment one receives.

#### *Things to do and think about before starting cancer treatment*

Until treatment starts one will not know what, if any, side effects or eating problems one may have. If you do have problems, they may be mild. Many side effects can be controlled. Many problems go away when cancer treatment ends.

- Think of the cancer treatment as a time to get well and focus just on self.
- Eat a healthy diet before treatment starts. This helps to stay strong during treatment and lowers one's risk of infection.
- Go to the Dentist. It is important to have a healthy mouth before starting cancer treatment.
- Ask a Doctor, Professional Nurse, or Registered Dietitian about medicine that can help with anticipated eating problems.
- Discuss fears and worries with the Doctor or Professional Nurse. He or she can discuss ways to manage and cope with these feelings.
- Learn about cancer of the pancreas and its treatment. Many people feel better when they know what to expect.

#### *Ways to get ready to eat well*

- Fill the refrigerator, cupboard, and freezer with healthy foods. Make sure to include items you can eat even when you feel sick.
- Stock up on foods that need little or no cooking, such as frozen dinners and ready-to-eat cooked foods.
- Cook some foods ahead of time and freeze in meal-sized portions.
- Ask friends or family to help you shop and cook during treatment. Maybe a friend can set up a schedule of the tasks that need to be done and the people who will do them.
- Talk with a Doctor, Professional Nurse, or Registered Dietitian about what to expect.

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Page 5

### Ways to get the most from foods and drinks during cancer treatment

During treatment, one may have good days and bad days when it comes to food. Here are some ways to manage:

- Eat plenty of protein and calories when possible. This helps one keep up one's strength and helps rebuild tissues harmed by cancer treatment.
- Eat when one has the biggest appetite. For many people, this is in the morning. One might want to eat a bigger meal early in the day and drink liquid meal replacements later on.
- Eat those foods that one can, even if it is only one or two items.
- Stick with these foods until one is able to eat more.
- One might also drink liquid meal replacements for extra kilojoules and protein.
- One must not worry if one cannot eat at all some days. Spend this time finding other ways to feel better, and start eating when one can.
- Inform the treating Doctor if unable to eat for more than 2 days.
- Drink plenty of liquids. It is even more important to get plenty to drink on days when no feeling like eating. Drinking a lot helps one's body get the liquid it needs.
- One should take between 30 and 35ml of fluid per kilogram of body weight per day. Environmental factors such as heat may affect the amount of fluid needed.

### Taking special care with food to avoid infections

Some cancer treatments can make one more likely to get infections. When this happens, one needs to take special care in the way one handles and prepares food. Here are some ways:

- Keep hot foods hot and cold foods cold. Put leftovers in the refrigerator as soon as one has done eating.
- Scrub all raw fruits and vegetables before eating them.
- Do not eat foods (like raspberries) that cannot be washed well. One should scrub fruits and vegetable which have rough surfaces, such as melons, before cutting them.
- Wash hands, knives, and counter tops before and after preparing food. This is most important when preparing raw meat, chicken, turkey, and fish.
- Use a different cutting board for meat and one for fruits and vegetables.
- Thaw meat, chicken, turkey, and fish in the refrigerator or defrost them in the microwave immediately before preparing them. Do not leave them sitting out.
- Cook meat, chicken, turkey, and eggs thoroughly. Meats should not have any pink inside. Eggs should be hard, not runny.
- Do not eat raw fish or shellfish, such as sushi and uncooked oysters.
- Make sure that all of juices, milk products, and honey are pasteurised.
- Do not use foods or drinks that are past their freshness date.
- Do not buy foods from bulk bins.
- Do not eat at buffets, salad bars, or self-service restaurants.
- Do not eat foods that show signs of mould. This includes mouldy cheeses such as bleu cheese.

### Special diets, vitamins, minerals and supplements

- Talk with the treating Doctor, Professional Nurse, or Registered Dietitian before going on a special diet or taking any vitamins, minerals or supplements.

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- To avoid problems, be sure to follow their advice.  
(National Cancer Institute).

### **Nutritional and Diet Guidelines**

Pancreatic cancer may be treated with surgery, chemotherapy, radiation therapy, or a combination. Regardless of treatment type, pancreatic cancer takes quite a toll on the body in terms of diet and nutrition. Here are some tips and guidelines to optimise nutrition during and after treatment.

Eat 5-6 small meals or snacks throughout the day - Smaller amounts of food are easier for the body to digest and absorb. It will also help to minimise nausea. Make sure that meals and snacks are balanced, nutritious and include a source of protein. Eat the largest meal when you feel the most hungry. Avoid eating too close to bedtime.

Eat foods that contain healthy fats - Avoid fried, greasy and fatty foods. These foods are hard to digest with an altered pancreas. Choose baked, broiled, or grilled foods instead. Healthy fats include monounsaturated and polyunsaturated fats such as canola oil, olive oil, nuts, and nut butters.

A nut butter is a spreadable foodstuff made by grinding nuts into a paste. The result has a high fat content and can be spread like true butter or margarine, but is otherwise unrelated.

Nut butters include:

- Almond butter
- Cashew butter
- Hazelnut butter
- Macadamia nut butter
- Peanut butter
- Pecan butter
- Pistachio butter
- Walnut butter

[Picture Credit: Nut Butters]



Eat as healthy as possible as allowed by the digestive system - Fruits, vegetables, lean protein, and whole grains are all nutrient dense foods. Nutrient dense foods are foods that contain protein, complex carbohydrates, healthy fat, vitamins, and minerals all needed by the body to function optimally. Consult a registered dietitian for specific recommendations based on one's level of food tolerance.

No single food will supply all the nutrients a body needs, so good nutrition means eating a variety of foods. It is important to eat foods from each group at each meal every day.

Foods are divided into five main groups:

- Fruits and vegetables (oranges, apples, bananas, carrots, and spinach)
- Whole grains, cereals, and bread (wheat, rice, oats, bran and barley)
- Dairy products (milk, cheese, and yogurt)

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- Meats and meat substitutes (fish, poultry, eggs, dried beans, and nuts)
- Fats and oils (oil, butter, and margarine)

It is important to eat foods from each food group at each meal every day. Meals and snacks should include starch/grains, protein, dairy, fruits, vegetables and fats. By eating foods from each food group at each meal, an individual ensures that the body has a proper balance of all nutrients it needs to function. Eating meals and snacks at regular times is also necessary for controlling blood sugar levels.

Eat whole grain foods when possible - Cereals, breads, brown rice, whole wheat pasta, and crackers are good whole grain choices. Whole grain foods will have “whole grain flour,” “whole wheat flour,” or “oats” as one of the first 3 ingredients. If diarrhoea is an issue, one may need to avoid whole grains due to their higher fibre content. A registered dietitian can provide guidelines for following a low residue diet for diarrhoea.

Avoid excess sugar and sweets - Since the pancreas plays a key role in the digestion of sugar, there is an increased chance that one will not digest overly sweet foods well. These foods also tend to provide the body with kilojoules but few nutrients.

If excessive weight loss becomes an issue, one’s body may need more kilojoules and it is fine if some of them come from sugar as long as one is able to tolerate sweet foods.

Try to eat with others when possible - Typically this makes meal times more enjoyable and may encourage one to eat more than eating alone.

Eat slowly and chew food really well - Digestion begins in the mouth. Smaller food particles are much easier to digest and are less likely to cause discomfort during the digestion process.

Sit up after eating - Wait at least 1 hour before lying down. Lying down after eating encourages acid to flow from the stomach back into the oesophagus leading to symptoms of heartburn. Stay in an upright position while food digests. This will keep the acid from the stomach in the stomach. It is not uncommon for pancreatic cancer patients to have heartburn, gas, bloating, and belching. Ask a registered dietitian for guidance on which foods to avoid when experiencing heartburn, gas, bloating, and belching.

Be as active as possible - Exercise may help to stimulate appetite and endorphin production. Being able to eat more and having an enhanced feeling of wellbeing will make your treatments more bearable.

Drink sufficient fluids to avoid dehydration - Choose beverages that contain nutrients and kilojoules. A good starting point is to strive for several glasses of nutritious beverages per day. Only take small sips with meals to avoid excessive bloating, gas or feeling too full to eat. The best time to drink fluids

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is an hour before or after a meal. Choose beverages that contain kilojoules and nutrients such as juices, smoothies, and liquid nutrition supplements.

A registered dietitian can provide recommendations for which liquid nutrition supplement and how much is best.

Avoid all alcoholic beverages - Alcohol is a Group 1 cancer causing agent according the International Agency for Research on Cancer (IARC) and is best avoided.

Keep a journal - Record eating times, foods consumed, and any effects to track and determine which foods are best tolerated.

Be observant of changes in bowel habits - One may experience symptoms of fat malabsorption which can be determined by the frequency of bowel movements and the appearance of stools. Fat containing stools are often bulky, frequent, foul smelling, and have an oily appearance. These symptoms warrant the need for vitamin A, D, E, and K supplements as well as a multivitamin. One may also need a calcium supplement. One's healthcare team can advise on choosing these as well as the correct dosage. Ask the treating oncologist about vitamin B<sub>12</sub> injections and iron to avoid becoming anaemic.

Take pancreatic enzymes as prescribed - These enzymes are designed to take the place of the enzymes that the pancreas would normally produce to digest protein, carbohydrates, and fat. The doctor will write a prescription for pancreatic enzymes. Consult a registered dietitian or doctor in the event of questions about pancreatic enzymes.

Take medication for diabetes as prescribed – In the instance of diabetes as a comorbidity, it is essential to maintain a balanced glycaemic state.

Maintain a good mass (weight) - It is normal to lose some weight after being diagnosed with pancreatic cancer and beginning on treatment. If losing more than ½ to 1Kg per week continuously, consult a registered dietitian immediately for recommendations on increasing kilojoule intake.

If there are any specific questions regarding any of the guidelines, please contact a registered dietitian.

(Pearlpoint Cancer Support; Medscape.)

### **Medical Disclaimer**

These Nutritional Guidelines are intended to provide general information only and, as such, should not be considered as a substitute for advice, medically or otherwise, covering any specific situation. Users should seek appropriate advice before taking or refraining from taking any action in reliance on any information contained in these Guidelines. So far as permissible by law, the Cancer

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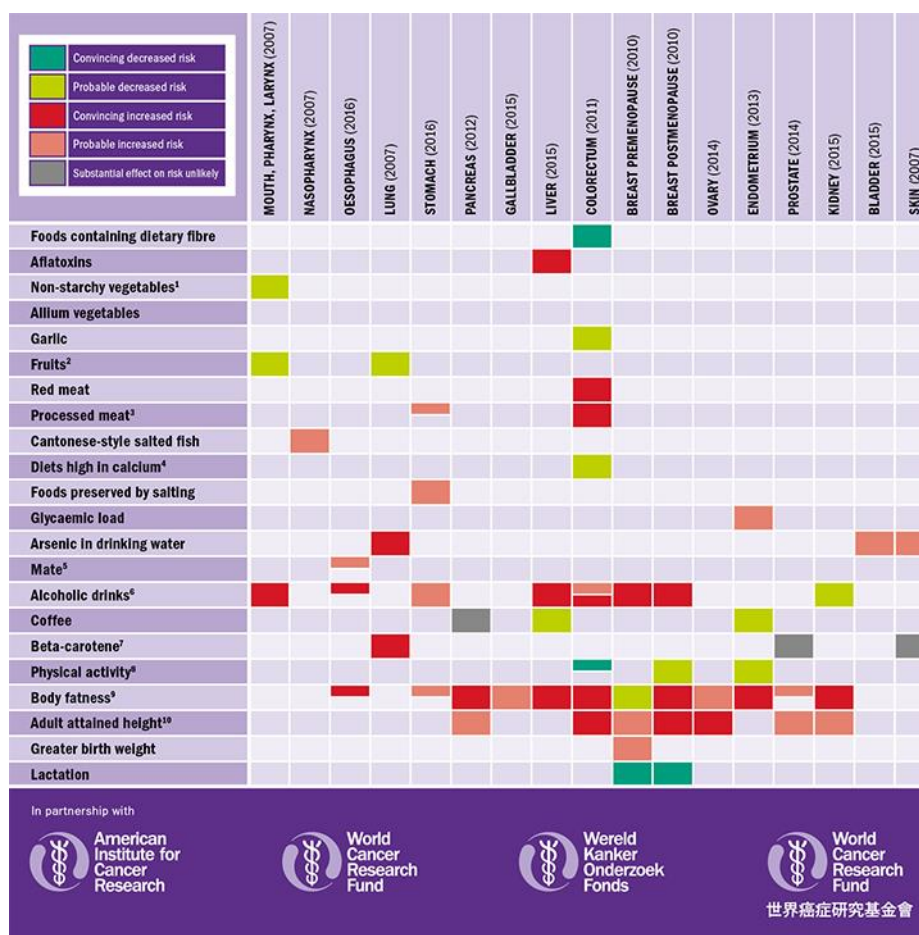
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### ADDITIONAL SUPPORT

For individualised nutritional advice, consult a registered dietitian in your area by visiting: <http://www.adsa.org.za/Public/FindARegisteredDietitian.aspx>

## Summary of Strong Evidence on Diet, Nutrition, Physical Activity and Cancer Risk Reduction



1 Includes evidence on foods containing carotenoids for mouth, pharynx, larynx. 2 Includes evidence on foods containing carotenoids for mouth, pharynx, larynx and lung.

3 For stomach, probable increased risk of non-cardia cancer only. 4 For colorectum, evidence is from milk and studies using supplements.

5 Probable increased risk for oesophageal squamous cell carcinoma only.

6 For oesophagus, convincing increased risk for oesophageal squamous cell carcinoma only. For liver and stomach, based on evidence for alcohol intakes above around 45 grams per day (about 3 drinks a day). For colorectum, convincing increased risk for men and probable increased risk for women. For kidney, based on evidence for alcohol intakes up to 30 grams per day (about 2 drinks a day).

7 For lung, evidence is from studies using high-dose supplements in smokers. 8 Convincing decreased risk for colon not rectum.

9 For oesophagus, convincing increased risk for adenocarcinoma only. For stomach, probable increased risk of cardia cancer only. For prostate, probable increased risk for advanced prostate cancer only.

10 Adult attained height is unlikely to directly influence the risk of cancer. It is a marker for genetic, environmental, hormonal and nutritional factors affecting growth during the period from pre-conception to completion of linear growth.

(World Cancer Research Fund International).

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