HARMONY
NUTRITION

Manual de Apoyo Nutricional Bariátrico

Una guía de nutrición completa basada en evidencia para cirugía bariátrica antes y después del procedimiento.

Introducción

Elegir someterse a una cirugía bariátrica es una decisión importante. Estamos aquí para apoyarte en tu camino hacia la pérdida de peso y asegurarnos de que logres tus objetivos y mantengas tu salud a lo largo de esta transformación. Los pacientes que se someten a una cirugía bariátrica se comprometen a realizar cambios de por vida en su estilo de vida, como cumplir con los suplementos dietéticos y consumir la cantidad adecuada de líquidos y proteínas cada día para evitar complicaciones médicas graves.

Cambios permanentes en el estilo de vida y la dieta son necesarios para lograr una pérdida de peso sostenida después de la cirugía, ya que la cirugía es solo una parte del tratamiento. El factor más importante en el bypass gástrico, la gastrectomía en manga y la cirugía bariátrica de revisión es comprometerse de por vida con tu dieta. Los estudios muestran que aproximadamente el 20-30% de los pacientes no logran resultados exitosos en la pérdida de peso después de la cirugía, y los pacientes pueden experimentar un aumento del 20-25% del peso perdido.

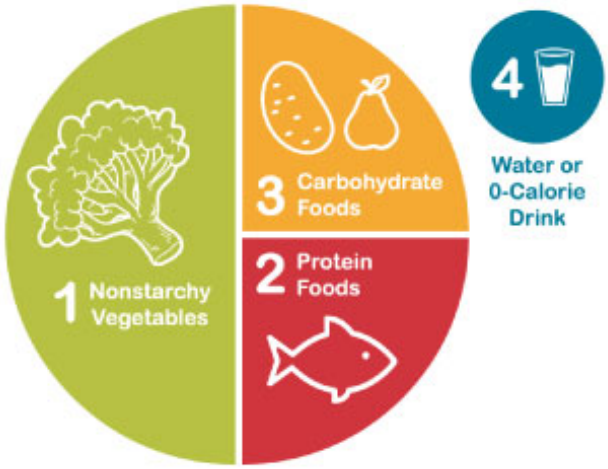
Se recomienda encarecidamente hacer seguimiento con tu dietista durante dos años después de la cirugía. La investigación ha demostrado que los pacientes que no tienen visitas de seguimiento tienen 4.6 veces más probabilidades de recuperar peso después de la cirugía.

El propósito de este manual es proporcionarte herramientas para ayudarte a tener éxito en tu viaje de pérdida de peso. Estamos encantados de formar parte de tu equipo de atención y esperamos celebrar tus victorias juntos.

Atentamente,
El Equipo Bariátrico de Harmony Nutrition

Preparando Tu Plato (Antes de la Cirugía)

-Llena la mitad de tu plato con vegetales no almidonados para promover la saciedad (sensación de estar lleno) después de una comida.
-Un cuarto de tu plato debe provenir de "proteínas magras". Las fuentes magras de proteína tienen más de la mitad de sus calorías provenientes de proteínas.
-Un cuarto de tu plato debe provenir de almidones complejos o frutas con menos azúcar.
-Evita las bebidas azucaradas, como el jugo de frutas y los refrescos.
-Bebe agua o una bebida sin azúcar.
- Consulta más información sobre edulcorantes en la página.
-Mira ejemplos de alimentos para llenar tu plato en las próximas cuatro páginas.



Vegetales sin Almidon

Elige al menos **1 taza de porciones cocidas o 2 tazas de porciones crudas de vegetales sin almidon** en el almuerzo y la cena. La lista a continuación ofrece ejemplos de vegetales no almidonados..

rúcula
espárragos
kale (col rizada)
pimientos (rojos o verdes)
bok choy
brócoli
judías verdes (ejotes)
guisantes de nieve brotes (de frijoles, alfalfa, etc.)
calabaza espagueti
tomates
coles de Bruselas
col
zanahorias
coliflor
apio hojas de col rizada (collard
pepino
espinaca

Proteins

Most foods contain a combination of carbohydrates, proteins, and fats. **In order for a food to be considered a protein, more than half of the calories coming from that particular food should come from protein.** Some examples are listed below.

Chicken Breast (3 oz)	141 Calories/26 g protein
Turkey-93% lean or greater (3 oz.)	128 Calories/16 g protein
Steak-lean cuts like sirloin	150 Calories/26 g protein
Ground Beef -90% lean or greater (3 oz.)	178 Calories/21 g protein
Egg White (3/4 Cup or 6 whites)	94.8 Calories/22 g protein
Powdered Protein Isolate (1 scoop of 20 g/Standard Scoop)	150 Calories/20 g protein
Low-fat Cottage Cheese (3/4 Cup)	122 Calories/21 g protein
Cooked white flaky fish (3 ounces)	95 Calories/21 g protein
Cooked shellfish (3 ounces)	84 Calories/18 g protein
Canned tuna in water (3 ounces)	97 Calories/21 g protein
String Cheese (1 oz. cheese)	180 Calories/22 g protein
Fat Free Greek Yogurt (5.3 ounces/standard cup)	100-120 Calories/12-15 g protein

Starches and Grains

Starches and grains provide carbohydrates which are our bodies preferred sources of energy. Choosing **higher fiber, lower sugar** options provides us with longer lasting energy throughout the day, leaves us feeling fuller longer, and helps to control blood sugar more effectively. Here is a list of what ONE serving of carbohydrates looks like. These **servings contain roughly 80 Calories and 15 g of carbohydrates and include** at least 2 g dietary fiber.

1/2 cup Acorn Squash
2/3 cup butternut squash
1 cup baby carrots
1/2 medium baked potato
1/2 medium sweet potato
1/3 cup cooked barley
1/2 cup cooked brown rice
1/2 cup cooked couscous
2/3 cup cooked whole wheat pasta
1/3 cup cooked quinoa
1/2 cup cooked wild rice
1/4 cup oats (dry/before cooking)
1 slice whole wheat of sprouted grain bread
1/2 cup legumes (chickpeas, kidney beans, black beans, pinto beans, green peas etc…)
3 cups light popped popcorn

Label Reading

1. Serving Information
2. Calories
3. Nutrients

Nutrition Facts

4 servings per container
Serving size **1 cup (227g)**

Amount per serving
Calories **280**

	% Daily Value*
Total Fat 9g	**12%**
Saturated Fat 4.5g	**23%**
Trans Fat 0g	
Cholesterol 35mg	**12%**
Sodium 850mg	**37%**
Total Carbohydrate 34g	**12%**
Dietary Fiber 4g	**14%**
Total Sugars 6g	
Includes 0g Added Sugars	**0%**
Protein 15g	
Vitamin D 0mcg	0%
Calcium 320mg	25%
Iron 1.6mg	8%
Potassium 510mg	10%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Intenta mantener bajo el 20% de tu %DV (porcentaje del valor diario) de sodio en cualquier elemento en particular.

Trata de mantener un consumo de menos de 25 gramos de azúcares añadidos al día.

Los Valores Diarios (VD) te ayudan a evaluar cómo se ajusta un alimento o bebida en particular a tu plan de alimentación diario:

• Los Valores Diarios son niveles promedio de nutrientes para una persona que consume 2,000 calorías al día.

• Recuerda: los porcentajes de VD son para el día completo, no solo para una comida o refrigerio.

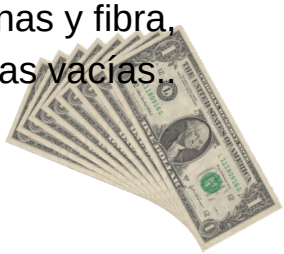
• Cada persona es única. Puedes necesitar más o menos de 2,000 calorías al día. Para algunos nutrientes, como el sodio, el colesterol y los azúcares añadidos, es probable que necesites menos del 100% del VD.

• Un 5 por ciento o menos es bajo: intenta mantener bajos los niveles de grasas saturadas, grasas trans, sodio y azúcares añadidos.

• Un 20 por ciento o más es alto: intenta aumentar el consumo de vitaminas, minerales y fibra dietética.

Azúcar

- Comienza a eliminar todas las bebidas azucaradas (té dulce, refrescos, jugos, bebidas de frutas, Gatorades, etc.) de tu dieta y reemplázalas por agua o bebidas saborizadas que no tengan azúcar añadido ni carbonatación antes de la cirugía.
- Un vaso de cocina promedio contiene aproximadamente 16 onzas de líquido. Cuatro onzas de jugo tienen alrededor de 60 calorías. Por lo tanto, un vaso de 16 onzas de jugo (o cualquier otra bebida azucarada) tendrá aproximadamente 240 calorías ¡y cero proteínas! Estas calorías vacías también te proporcionan escasas vitaminas, minerales, proteínas y fibra, razón por la cual nos referimos a estos productos como calorías vacías..



¡Piensa en tus calorías como dinero!!

Todos tienen una cierta cantidad de calorías que necesitan al día. Exceder esta cantidad es parte de lo que contribuye al aumento de peso. De manera similar, todos tienen una cierta cantidad de dinero que deberían gastar al día. Si gastas más que esto, puedes "sobregirarte".

Comer más calorías de las que tu cuerpo necesita es como "sobregirarse". Supongamos que tienes 1,400 calorías que puedes consumir al día. Tienes hambre y te gustaría "gastar" 100 calorías. Considera la imagen a continuación.

- **10 papas fritas proporcionan: 0 g de fibra 0 % VD (porcentaje del valor diario) de vitamina C 250 mg de sodio 6 g de grasa**

- **28 zanahorias babe: 6 g de fibra 12 % VD (porcentaje del valor diario) de vitamina C 180 mg de sodio 0 g de grasa**

¿Qué alimento crees que es una mejor forma de "gastar" tus 100 calorías?

Edulcorantes artificiales

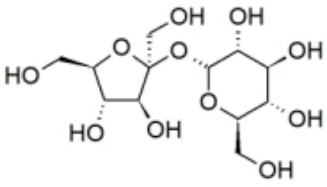
Sustituir el azúcar por edulcorantes artificiales, como los que se encuentran en las bebidas de dieta y los dulces y jugos sin azúcar, no respalda la pérdida de peso cuando se utilizan como medio principal de restricción calórica.

Una revisión de 2010 publicada en el "Yale Journal of Biology and Medicine" encontró una asociación entre las bebidas de dieta con edulcorantes artificiales y el aumento de peso. Otra revisión de 2010 publicada en el "International Journal of Pediatric Obesity" encontró una relación entre las bebidas endulzadas artificialmente y el aumento de peso en niños. Dado que las bebidas de dieta tienen un sabor dulce, pueden provocar un deseo de consumir más azúcar, al igual que las bebidas regulares. Por esta razón, se recomienda limitar la ingesta de edulcorantes artificiales. No es necesario evitarlos por completo.

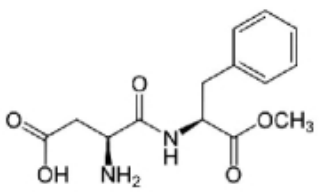
Después de la cirugía, querrás evitar los alimentos con más de 2 g de alcoholes de azúcar (sorbitol, manitol, xilitol, eritritol) por porción, ya que pueden provocar gases excesivos, hinchazón y/o diarrea.

El extracto de stevia y el extracto de monk fruit son edulcorantes naturales y sin calorías que se consideran seguros después de la cirugía bariátrica.

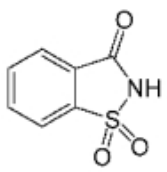
Sucrose (table sugar)



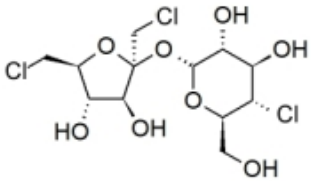
Aspartame (NutraSweet, Equal)



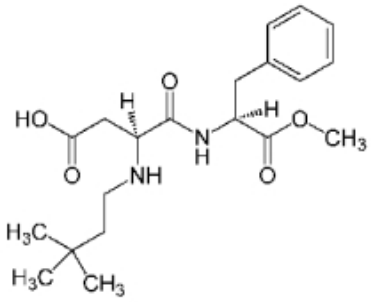
Saccharin (Sweet N' Low)



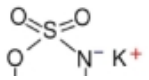
Sucralose (Splenda)



Neotame (in Ice Breakers Mints)



Acesulfame Potassium (Sunett, Sweet One)



Ingesta de Liquidos

- El agua no tiene calorías. Cambiar de bebidas con alto contenido calórico al agua puede ayudarte a lograr y mantener un peso corporal saludable al reducir tu ingesta total de calorías en 500 a 1,000 calorías al día.
- El agua te ayuda a sentirte lleno, y beber agua antes de una comida puede ayudarte a consumir menos calorías al comer. Algunas personas confunden la sed con el hambre y comen cuando en realidad tienen sed.
- Los hombres deben consumir al menos 13 tazas de líquidos al día y las mujeres deben beber al menos 9 tazas. Cumplir con estos requisitos mínimos de líquidos con agua es beneficioso para la pérdida de peso.
- El proceso de pérdida de grasa requiere hidrólisis, que es un proceso químico que requiere agua. Por lo tanto, una ingesta inadecuada de agua ralentizará químicamente la pérdida de peso en tu cuerpo.

Edulcorante Naturales/Saborizantes:

Si todavía estás ajustándote al sabor del agua simple, considera estos goteros de sabor que no contienen edulcorantes artificiales.
Stur® y True Lemon®: Endulzados con stevia, un edulcorante natural y sin calorías. Sweet Leaf®: Endulzados con extracto de fruta del monje y stevia, ambos edulcorantes naturales y sin calorías.
También puedes considerar agregar limón o pepino al agua.

Sodio

La mayoría de los estadounidenses consumen demasiado sodio a través de los alimentos que consumen. Y, el sodio en la sal desempeña un papel en la hipertensión arterial, también conocida como presión arterial alta. (La sal es el nombre común del cloruro de sodio). Las Directrices Dietéticas para los Estadounidenses 2020-2025 recomiendan que los adultos consuman menos de 2,300 miligramos al día de sodio.

- **Enfócate en alimentos frescos**. Muchos alimentos en su forma original, como frutas, verduras, carnes frescas, aves, pescado, frijoles secos, huevos, leche, yogur y granos como arroz, son naturalmente bajos en sodio. Incluye estos alimentos con más frecuencia en tus comidas y refrigerios.
- **Consume alimentos procesados y preparados con menos frecuencia**. Los alimentos altamente procesados y listos para comer tienden a tener un mayor contenido de sodio. Consume estos alimentos solo ocasionalmente o en cantidades más pequeñas, especialmente alimentos con queso, como la pizza; carnes curadas como el tocino, salchichas, hot dogs y embutidos; y alimentos listos para comer, como chiles enlatados, sopas y fideos y arroz instantáneos.
- **Cocina en casa con más frecuencia.** Disfruta de alimentos preparados en casa, donde tienes control sobre la cantidad de sal que se agrega. Usa poca o ninguna sal al cocinar. Incluso si las instrucciones del paquete dicen que agregues sal al agua antes de hervirla, no es necesario y a menudo se puede omitir. Cuando uses verduras enlatadas con sal añadida, asegúrate de escurrir y enjuagar las verduras para reducir la cantidad de sal.
- **Prueba nuevos sabores.** Omita la sal y prueba condimentos sin sal, como hierbas, especias, ajo, vinagre, pimienta negra o jugo de limón. Crea tus propios condimentos sin sal combinando hierbas y especias secas.

Continua con el sodio

- **Lee la etiqueta de Información Nutricional** y la lista de ingredientes para encontrar alimentos envasados y enlatados con menos sodio. Compara la cantidad de sodio indicada y selecciona el producto con la menor cantidad.
- **Busca alimentos etiquetados como "bajo en sodio**", "reducido en sodio" o "sin sal añadida".
- **Ten cuidado con los condimentos**. Alimentos como la salsa de soja, el ketchup, los pepinillos, las aceitunas, el aderezo para ensaladas y los paquetes de condimentos son ricos en sodio. Prueba la salsa de soja y el ketchup bajos en sodio. Utiliza solo una pequeña cantidad de un paquete de condimentos, no la cantidad completa.
- **Permite que tus papilas gustativas se adapten**. Como con cualquier cambio, puede llevar tiempo que tus papilas gustativas se acostumbren a menos sal. Los alimentos bajos en sodio pueden tener un sabor diferente al principio, pero con el tiempo es posible adquirir el gusto por alimentos con menos sodio.
- **Mezclas de condimentos sin sal:** Potencia el sabor de los alimentos con mezclas de hierbas y especias sin sal. Combina los ingredientes y guárdalos en un frasco bien tapado. Espolvoréalos o esparce sobre los alimentos para darles más sabor.
- **Mezcla de hierbas mixtas**: Mezcla ¼ de taza de hojas de perejil secas, 2 cucharadas de estragón seco y 1 cucharada de orégano seco, eneldo seco y hojuelas de apio.
- **Mezcla italiana**: Mezcla 2 cucharadas de albahaca seca y 2 cucharadas de mejorana seca, 1 cucharada de ajo en polvo, 1 cucharada de orégano seco y 2 cucharaditas de tomillo, romero seco triturado y pimiento rojo triturado.
- **Mezcla mexicana**: Mezcla ¼ de taza de chile en polvo, 1 cucharada de comino molido y cebolla en polvo, 1 cucharadita de orégano seco, ajo en polvo y pimiento rojo molido y ½ cucharadita de canela.

Scheduled Nutrition Visits

Before clients undergo bariatric surgery, to decrease surgical risk, they should be evaluated to determine if their nutrition goals such as appropriate weight loss and repletion of vitamin and mineral deficiencies have been achieved.

After surgery, your dietitian visits are essential for your success. The table below provides you with an idea of how many visits to expect and when to schedule them.

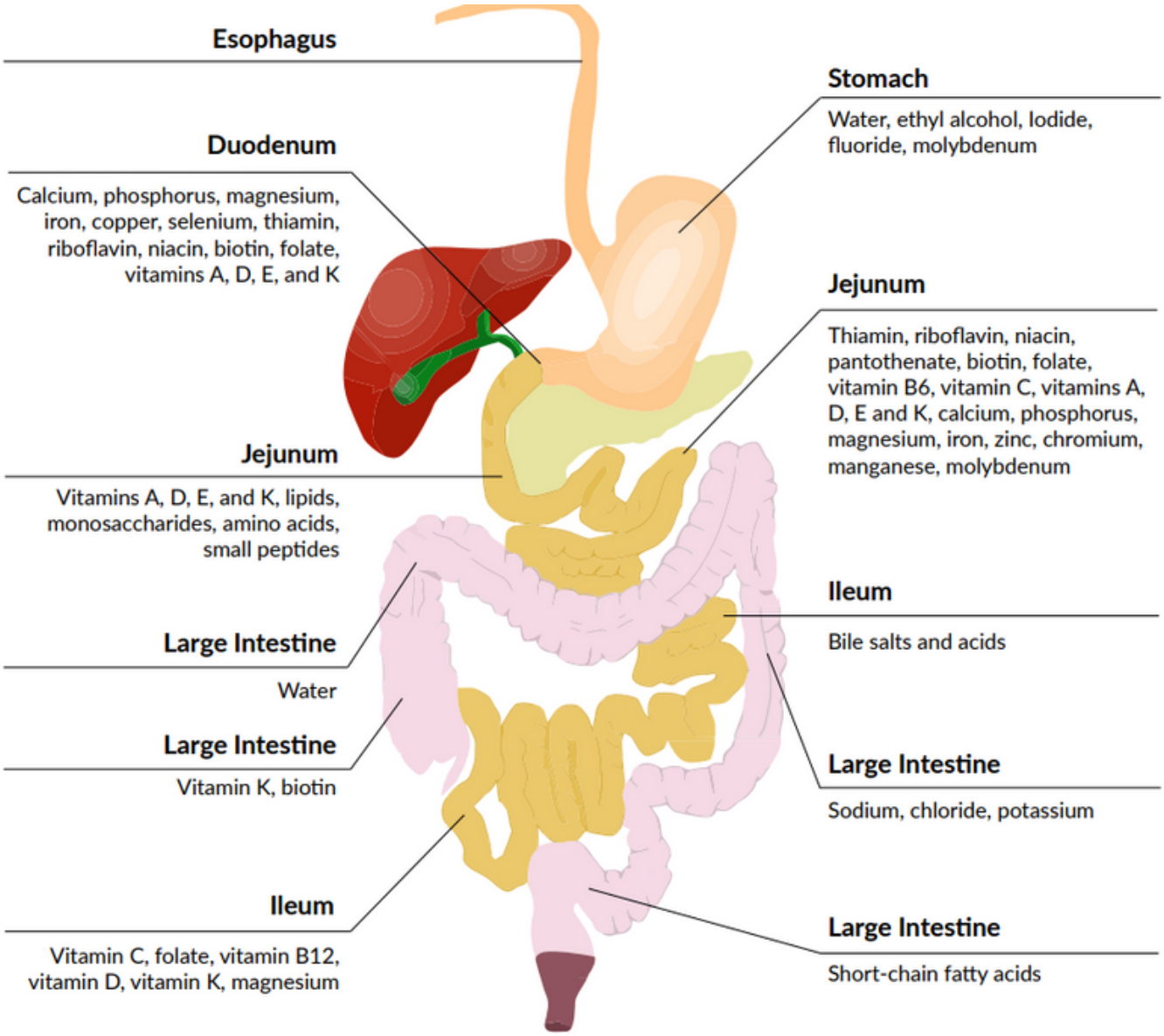
	Pre-Surgery
3-6 Months Before Surgery	Screen for nutrient deficiencies to prevent post-surgical complications Establish lifestyle and dietary changes to support weight loss after surgery and achieve pre-surgery weight loss.
	Post-Surgery
2 weeks	Advance diet, assess tolerance and adequacy of fluid intake
6 and 9 weeks	Group nutrition education class (or individual consultation if groups are not feasible); these classes may include meal and snack ideas, ways to increase protein or fluid, managing emotions, safe physical activity, and/or preventing and managing common complications
12 weeks	Individual consultation with RDN to assess progress
4 to 9 months	Nutrition groups to address behavioral issues, nutrition, building healthy habits, and physical activity
6 to 9 months & 1 year	Individual consultation to assess progress
2-5 years	Groups or individual sessions to support, educate, and reinforce healthy behaviors and review weight changes. MNT is helpful at this time because most patients experience increased hunger and some weight regain 2 to 5 years postsurgery.

Lab Work

Vitamin and Mineral Deficits Related to Obesity	**Goal Laboratory Value**
Thiamine, serum	Serum thiamine: 4-15 nmol/L
Iron, serum Total iron-binding capacity (TIBC)	Serum iron: 37-158 mcg/dL TIBC: 250-450 mcg/dL *Serum ferritin should not be used because iron is an acute-phase reactant and may fluctuate with age, inflammation, and infection.
B12, serum Methylmalonic acid, serum	Serum vitamin B12: 200-1000 pg/mL Serum methylmalonic acid: 73-271 nmol/L (elevated levels indicate deficiency)
Folate, serum	Serum folate:" 340-1020µg/mL
Zinc, serum	60-130 mcg/dL
Copper Ceruloplasmin, serum	Serum ceruloplasmin: 75-145 µg/dL *Interpret results with caution, as ceruloplasmin often decreases in times of inflammation
Vitamin D, 25-OH (25-hydroxyvitamin D)	Vitamin D 25-OH: greater than 30 ng/mL
Fat soluble vitamins (A,E,K) Vit A: serum retinol binding protein (RBP)and plasma retinol Vit E: plasma alpha tocopherol	Plasma retinol: 20-80 µg/dL RBP: no value specified Plasma α-tocopherol: >5µg/mL
Parathyroid hormone	iPTH is increased in vitamin D deficiency; deficiency if iPTH greater than 65 pg/mL

Micronutrients

Bariatric surgery impacts the anatomy of your digestive system in several different ways - most of your stomach is removed and the small intestine is bypassed. These changes impact micronutrient absorption, making it necessary to supplement with vitamins and minerals.



Iron

Iron is an essential mineral that the body needs for growth and development. Your body uses iron to make hemoglobin, a protein in red blood cells that carries oxygen from the lungs to all parts of the body, and myoglobin, a protein that provides oxygen to muscles. Iron deficiency can lead to GI upset, weakness, tiredness, lack of energy, and problems with concentration and memory. You may also get sick more easily as iron deficiency decreases your body's ability to fight off germs and infections. There are several ways that bariatric surgery can lead to iron deficiency.

- Bariatric surgery typically leads to overall reduced iron intake due to a considerable reduction in your meat intake. Ruz et al.[72]
- Bariatric surgery procedures reduce your stomachs capacity to produce hydrochloric acid. This acid plays an important role in the conversion of iron from your food into a more absorbable form of iron that your body can use.
- Bariatric surgery leads to a reduction of the total absorption surface area in your digestive tract. Iron deficiency is especially prevalent in RYBP, precisely due to reduction of stomach capacity [73] in addition to bypass of the first part of your small intestine which is where iron absorption takes place.

Supplementation: Constipation from iron supplements can often be reduced by simply decreasing your daily dose but only if your doctor agrees after getting your lab results. Most iron supplements are made from ferrous or ferric salts. You may need to switch the type of supplement you're taking from this type of product to an alternative one. Iron supplements that are less likely to cause constipation include:

- Heme iron polypeptides
- Carbonyl iron
- Iron amino-acid chelates
- Polysaccharide-iron complexes
- Ferrous bisglycinate (This type also requires less iron to be effective compared to other forms of ferrous iron)

Vitamin B12

Vitamin B12 plays an important role in the formation of red blood cells and DNA. It also contributes to the development of brain and nerve cells. Inadequate vitamin B12 in the body can contribute to serious complications including fatigue, weakness, nerve damage with numbness, tingling in the hands and legs, memory loss, confusion, dementia, depression, and seizures.

The main mechanism by which bariatric surgery patients develop vitamin B12 deficiency is associated to a reduced production of intrinsic factor by limited number of parietal cells with consequent decrease in cobalamin-intrinsic factor complex formation and absorption. Metformin use also affects the absorption of vitamin B12.

Supplementation:

- Patients require 350 mcg to 500 mcg/day of orally dissolving tablet, sublingual, liquid, or nasal spray
- Patients may also opt for a once monthly injection of 1000 mcg

Folate

Folate (otherwise known as vitamin B9) plays many important roles in the body including tissue growth, cell formation, working with vitamin B12 and vitamin C to help the body break down, use, and create new proteins, formation of red blood cells (helps prevent anemia), and DNA production. Complications related to inadequate folate include diarrhea, gray hair, mouth ulcers, peptic ulcer, poor growth, and swollen tongue (glossitis).

Folate deficiency occurs due to bypass of first parts of the small intestine, which are the main sites of absorption.

Supplementation:

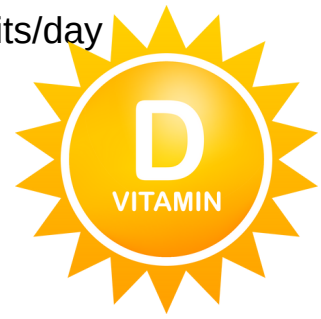
- Initiate daily multivitamin (100% DV) that contains 400 mcg folic acid, to be taken twice daily
- Because this supplement is especially important for all women of childbearing age, patients in this category should consume 800 mg to 1000 mg daily. This may require additional supplementation.

Vitamin D

Vitamin D is a nutrient that helps your body absorb calcium and phosphorus. This vitamin is essential for building and maintaining healthy bones. Few foods naturally contain vitamin D - most foods are fortified with it. Sunlight is great source of vitamin D! The bioavailability of vitamin D is reduced in the obese state, because vitamin D is sequestered in adipose tissue. Vitamin D deficiency is also more likely after bariatric surgery due to decreased fat intake and dairy intake.

Supplementation:

- Vitamin D supplementation is dependent on vitamin D status
- Vitamin D "normal" range = 25-80 ng/mL
- If vitamin D <20 ng/mL , initiate 50,000 IU vitamin D3 (cholecalciferol) or vitamin D2 (ergocalciferol) weekly for 8 weeks. Consider adding maintenance dose of vitamin D3 (3,000 IU/day) daily if level is persistently low
- If vitamin D is 25 ng/mL to 30 ng/mL, initiate 3,000 IU vitamin D3 daily for maintenance.
- Preoperative supplementation for vitamin D maintenance: 1,000 international units/day to 2,000 international units/day (including vitamin D from multivitamin); do not exceed 4,000 international units/day



Calcium

Calcium is a mineral that is essential for building healthy bones, regulating a normal heart beat, and helping muscles contract. When the body isn't given enough calcium through diet, it begins to take the mineral from other parts of the body including our bones - this can decrease bone mineral density. A chronic calcium deficiency may lead to an increased risk of fractures and osteoporosis.

Supplementation:

- Goal lab value: 8.5 to 10.2 mg/dL (2.13 to 2.55 millimol/L)
- Daily calcium needs are 1,200–1,500 milligrams per day after a sleeve gastrectomy or Roux-en-Y gastric bypass
- After a duodenal switch, you need 1,800–2,400 milligrams per day of calcium
- Your body can only absorb 500–600 milligrams of calcium at one time. To enhance absorption, take your supplement as three divided doses throughout the day. You may need to take a calcium supplement with meals for better absorption.

Zinc

Obesity is often accompanied by hyperinsulinemia (high amount of insulin in the blood), which can occur when the body does not respond correctly to insulin, causing the pancreas to produce even more insulin. Hyperinsulinemia is associated with excessive urinary excretion of zinc, therefore decreased plasma zinc. Zinc deficiency can cause a loss of appetite, and impaired immune function. In more severe cases, zinc deficiency causes hair loss, diarrhea, impotence, hypogonadism in males, and eye and skin lesions.

Supplementation:

- Goal lab value: 60-130 mcg/dL
- Supplement with a multivitamin

Thiamine

Thiamine (also known as vitamin B1) is a member of the water-soluble B vitamins. It is mainly known for it's role in carbohydrate metabolism. Nausea and vomiting are common occurrences after bariatric surgery. This side effect may be related to a variety of factors including patient eating behaviors or surgery-related complications, such as stenosis and/or bowel obstruction. Persistent vomiting following bariatric surgery can lead to a thiamine deficiency in the long-term.

Supplementation:

- Goal lab value: Serum thiamine: 4-15 nmol/L
- Supplement with a multivitamin

Copper

Copper has many functions including helping the body form red blood cells, keeping the immune system healthy, and aiding in iron absorption. There is a proposed link between low levels of cellular copper and an increased size in fat cells due to the potential altering of how cells process their main metabolic fuels, such as fat and sugar. Rates of copper deficiency may be relatively high among pre-bariatric surgery patients and may contribute to neurologic disease and/or hematologic abnormalities in extreme cases. Other symptoms may include anemia, low body temperature, bone fractures and osteoporosis, low white blood cell count, irregular heartbeat, loss of pigment from the skin, and thyroid problems.

Supplementation:

- Goal lab value: Serum ceruloplasmin: 75-145 µg/dL
- Supplement with a multivitamin

Fat-Soluble Vitamins - A, E, and K

Vitamins A, **E**, and **K** are three of the four fat-soluble vitamins. These vitamins dissolve in fat and are mainly stored in fatty tissue. Bypassing the duodenum (particularly in the roux-en-Y gastric bypass) can have a major influence on malabsorption following surgery, since fat-soluble vitamins are absorbed in the duodenum. In addition to this, the post-surgery diet is typically low calorie, high protein and *low-fat.* Due to these factors, a fat-soluble vitamin deficiency can occur.

Vitamin A

Vitamin A is an essential fat-soluble vitamin absorbed through the small intestine as either retinol or carotene. There are a few different mechanisms that may lead to a vitamin D deficiency following a gastric bypass. A deficiency may arise from surgically bypassing the duodenum and first portion of the jejunum, which may promote malabsorption. A decrease in dietary intake of vitamin A through food may occur due to decreased intake. Finally, a low-fat diet, which likely limit the absorption of fat-soluble vitamins, may also contribute to a deficiency.

Vitamin A deficiencies have been found in 14% of patients (Parrot, et al.) with obesity pre-bariatric surgery and in up to 70% of patients (Parrot, et al.) who have undergone the the roux-en-Y gastric bypass surgery. Rare cases of vitamin A deficiency can lead to corneal damage, blindness, and abnormally dry skin.

Supplementation:

- Goal lab value: 20 to 60 micrograms per deciliter (mcg/dL) or 0.69 to 2.09 micromoles per liter (micromol/L)
- Supplement with a multivitamin

Vitamin E

Vitamin E is an antioxidant that is important for your skin, brain, blood, and vision. Antioxidants are substances that protect your cells from free radicals. Though rare, signs and symptoms of vitamin E deficiencies include gait disturbances, muscle weakness, and hemolytic anemia. Only 2.2% of patients (Parrot, et al.) with obesity present with vitamin E deficiency before surgery and reports of vitamin E deficiency following bariatric surgery are rare, too. However a deficiency can occur due to significant fat malabsorption.

Supplementation:

- Goal lab value: 7 - 25.1 mg/L
- Supplement with a multivitamin

Vitamin K

Vitamin K plays an essential role in blood clotting and regulating blood calcium levels. The causes of vitamin K deficiency in patient who undergo bariatric surgery include decreased absorptive surface areas, steatorrhea, bacterial overgrowth, marked reduction of carriers of vitamin K, decrease in vitamin K intake, and modifications of gut microbiota (Sherf-Dagan et al., 2019). Signs and symptoms of vitamin K deficiencies include hemorrhage, bruising, delayed blood clotting, and nose bleeding.

Supplementation:

- Goal lab value: 130 - 1500 pg/mL
- Supplement with a multivitamin

Supplement Guidance

Follow the guidance on the types of vitamins and minerals you will need to take for the rest of your life:

Multivitamin with minerals including iron:
Take a chewable multivitamin with iron twice daily.
Multivitamins should be taken at separate times throughout the day to improve absorption.
Avoid gummy type vitamins—they do not have all the nutrients your body needs.
Since you will be taking 2 multivitamins a day, you will need a supply of at least 60 chewable tablets for the first month after surgery.

Vitamin B12:
Take 350 to 500 micrograms (mcg) of vitamin B12 every day.
You can take B12 as an oral, sublingual (under your tongue), or nasal supplement. You may also have the option to receive a monthly shot of 1,000 micrograms of B12 from your health care provider.
Do not buy time-release B12.
You can take a full daily dose of B12 at once. You do not need to divide the doses throughout the day.

Vitamin D-3
The recommended dose of vitamin D is 3,000 IU a day in liquid or gel cap form.
You can take a full daily dose of vitamin D-3 at once.
You do not need to divide the doses throughout the day.
Be sure to count the amount of vitamin D you are getting from your multivitamin, which can contain between 500- 1000 IU (12.5 mcg to 25mcg) of vitamin D.

Calcium
You can take a supplement that has calcium and vitamin D, but be sure to count the amount of Vitamin D in the combined supplement.
Different amounts of calcium are needed based on the type of surgery you received:

- **Laparoscopic adjustable gastric banding, sleeve gastrectomy, Roux-en-Y gastric bypass:** 1,200 milligrams (mg) per day.
- **Biliopancreatic diversion, duodenal switch:** 1,800 milligrams (mg) per day

Calcium is best absorbed when it's taken in doses of less than 600 mg at a time.
You will need to take more than 1,000 mg of calcium daily, so divide your doses into two or more throughout the day.

- Take separately from multivitamin (the iron from multivitamin effects absorption)
- Allow 2-3 hours between doses; 500mg at a time
- Avoid drinking more than 16 oz. of decaf tea; the tannin in the tea decrease absorption
- Some calcium supplements need to be taken with food. Always read the label for dosing instructions.

Protein Intake

Next to water, protein is the most abundant substance in the human body. The word “protein” is derived from the Greek word meaning “of first importance”. This is literally true for the bariatric surgery patient. Protein is the most important nutrient in the bariatric diet.
Why is protein so important?

- Protein aids in proper wound healing after bariatric surgery
- Protein helps keep your hair, skin, bones and nails healthy
- Protein helps form hormones, enzymes and immune system antibodies to help your body function properly
- Protein helps your body burn fat instead of muscle for a healthier weight loss
- Protein supports your natural metabolism

Your protein needs are based on body size. Taller people have a higher ideal bodyweight than shorter people. Use the table below to determine your protein needs:

60 - 80 grams per day if you are 4 foot 11 inches up 5 foot 3 inches.
80 - 100 grams per day if you are 5 foot 4 inches up to 5 foot 9 inches.
100 - 130 grams per day if you are 5 foot 10 inches up to 6 foot 4 inches.

After the initial 2-3 weeks of protein shakes only (after surgery)

- Eat protein with every meal and snack
- Eat your protein first, veggies/fruit second, complex carbohydrates when/if you have room (and not before 9 weeks after surgery)

Protein Shakes/Drinks

Protein drinks must have (per bottle):

- **at least 20 g protein**
- **less than 10 g of carbohydrates**
- **less than 5 g sugar**
- **The best type of protein drinks/powders are sourced from whey, soy, or egg.**

Avoid protein drinks that have sugar alcohols (erythritol, glycerol, mannitol, sorbitol and xylitol) as these may cause severe gastrointestinal cramping.

Sweeteners that are OK: Stevia, Monk Fruit Extract, Sucarlose,

Iconic	140 Calories 20 g Protein 8 g Carbohydrates
Evolve	140 Calories 20 g Protein 7 g (net) carbohydrates
Orgain Protein Drink	150 Calories 26 g Protein 5 g (net) carbohydrates
Owyn	180 Calories 20 g Protein 5 g (net) carbohydrates
Unjury Ready to Drink Protein Shake	110 Calories 20 g Protein 2 g Carb
Premier Protein Shake (11 oz.)	160 Calories 30 g Protei 4-5 g Carb
Ensure Max Protein Shake	150 calories 30 g Protein, 6 g Carb

Preparing For Surgery

Now that you have made the decision to have your surgery, it is time to ensure you have the tools for success following your surgery. We are here to help you feel confident and prepared! Below are some tips that we recommend getting started with as you prepare for surgery in the near future:

- **Chew your foods thoroughly**
  - Slow down your eating and chew your foods down to an applesauce consistency.
  - It can be helpful to cut your food down into smaller bites.
  - Not chewing your food enough could result in pain, nausea and vomiting.
- **Eat when you are hungry and stop when you are full**
  - Try to avoid distractions at meal time and make sure to honor your hunger.
  - Pay close attention to early signs of fullness. You do not need to feel full. Think 80% full = STOP
- **Sip on beverages slowly and in between meal time**
  - Drinking too soon after eating may cause pain and discomfort.
  - Wait about 30 minutes after a meal to drink a beverage.
- **Stay hydrated by keeping a water bottle with you at all times**
  - Hydration needs are individualized, however as a general rule - you should aim for at least 64 oz. of water per day.
  - Aim for 75 to 100 ounces of fluid per day (including protein drinks) to avoid constipation.
  - Avoid using straws post-surgery as they can introduce air into your stomach.
- **Pay attention to the ingredients in your beverages**
  - Slowly wean off from carbonation, caffeine, sugar and alcohol.
  - Carbonation, caffeine, and alcohol may cause GI agitation, while added sugar may counteract the weight loss.
  - Water is a great choice of beverage - sometimes adding cucumber or other fruit can add great flavor.
  - Carbonated drinks can cause gas and bloating and should NOT be used after surgery
  - Limit coffee and caffeine drinks to one cup per day in the first few weeks. It can cause dehydration and can stimulate the bowel, causing cramps or diarrhea
  - Avoid concentrated sugars and fats. They can lead to slower weight loss. Avoid high calorie liquids and high fat foods that can melt in your mouth (NO “SLIDER” Foods) such as milkshakes. These foods will likely cause dumping syndrome.

Preparing For Surgery (continued)

- **Experiment with different protein shakes and protein powders**
  - Choose a protein shake that contains at least 20-30 grams of protein per serving.
  - ***See page on protein shakes for more information**
- **Start exercising before surgery**
  - Get into the habit of exercising prior to surgery so that it is already a part of your routine. Assess where you are at and see what type of exercise you can add to your routine.
  - The Physical Activity Guidelines for Americans recommends getting at least 150 minutes of moderate aerobic activity per week. Strength training is also extremely beneficial for maintaining lean muscle mass.
- **Establish support**
  - Find support through your friends, family, online groups, and your care team.

2 Week Pre-Op

Clear liquids + protein drinks are recommended for 2 weeks before bariatric surgery and 2 weeks after bariatric surgery. A clear liquid diet consists of both clear liquids and clear foods that turn to liquid at room temperature.
Not allowed: Milk, tomato juice, and fruit nectars are not clear liquids.
Allowed: sugar free, calorie free, non-carbonated drinks
Examples:
• Water or water with Stur or Sweet Leaf flavor drops
• Sugar Free Sports drinks such as Bai, Powerade Zero, Gatorade Zero, Propel
• Vitamin Water Zero
• Sugar free freezer popsicles without pieces of fruit in it
• Sugar free Jello
• Fat free broth
  - Bone broth is also a great source of protein
• Black decaffeinated coffee- can add a sugar substitute such as stevia or Monk fruit extract
• Unsweetened decaffeinated tea/Diet tea

Fluid goal:
At least 64 ounces water per day (about 4 bottles-16oz of water

Drink, drink, drink! -

- Sip fluids throughout the day and avoid gulping.
- Do not use straws.
- Do not drink during meals and wait 30 minutes after meals before drinking fluids -
- Signs of dehydration:
  - Dry, sticky mouth
  - Sleepiness or tiredness
  - Headache
  - Extreme thirst
  - Irritability and confusion
  - Sunken eyes
  - Dry skin that doesn’t bounce back when you pinch it

2 Week Pre-Op Sample Meal Plan

8:00 AM	1/2 Protein Drink Multivitamins, B-12, Vitamin D-3, Iron (if taking)
9:00 AM	8 ounces water
10:00 AM	8 ounces water/fluid. 1 serving of fruit
11:00 AM	8 ounces water/fluid
12:00 PM	1 Protein Drink, Calcium Supplement
1:00 PM	8 ounces water/fluid, 4 ounces sugar free jello
2:00 PM	8 ounces water/fluid
3:00 PM	8 ounces bone broth, Calcium supplement
4:00 PM	8 ounces water/fluid
5:00 PM	8 ounces water/fluid
6:00 PM	3-5 ounces lean protein (baked, broiled, grilled, boiled), ½-2 Cups NON-starchy vegetables (NO corn peas beans, lentils, potatoes); NO bread/pasta/rice/fruits, 1 serving of fat is allowed (1 tsp oil or 1 Tbsp salad dressing)
7:00 PM	Sugar Free Popsicle
8:00 PM	8 ounces water
Nutrition Goals:	Fluid: 72 ounces Protein: 60 to 130 g Calories:

Day Before Sample Meal Plan

8:00 AM	1/2 Protein Drink Multivitamins, B-12, Vitamin D-3, Iron (if taking)
9:00 AM	8 ounces water
10:00 AM	8 ounces water/fluid. Sugar Free Jello
11:00 AM	8 ounces water/fluid
12:00 PM	1/2 Protein Drink, Calcium Supplement
1:00 PM	8 ounces water/fluid
2:00 PM	8 ounces water/fluid
3:00 PM	Sugar Free Popsicle
4:00 PM	8 ounces water/fluid
5:00 PM	8 ounces water/fluid
6:00 PM	1 Protein Shake 3rd calcium if needed
7:00 PM	8 ounces fat free broth
8:00 PM	8 ounces water
Nutrition Goals:	Fluid: 72 ounces Protein: 60 to 80 g Calories:

2-4 Weeks Post-Op Sample Meal Plan

8:00 AM	1/2 Protein Drink Multivitamins, B-12, Vitamin D-3, Iron (if taking)
9:00 AM	8 ounces water
10:00 AM	8 ounces water/fluid. 4 ounces bone broth
11:00 AM	8 ounces water/fluid
12:00 PM	1/2 Protein Drink, Calcium Supplement
1:00 PM	8 ounces water/fluid
2:00 PM	8 ounces water/fluid
3:00 PM	1/2 Protein Shake
4:00 PM	8 ounces water/fluid
5:00 PM	8 ounces water/fluid
6:00 PM	1/2 Protein Shake 3rd calcium if needed
7:00 PM	8 ounces bone broth
8:00 PM	8 ounces water
Nutrition Goals:	Fluid: 72 ounces Protein: 60 to 80 g Calories:

Soft Proteins

Start to replace protein drinks with soft, semi-solid protein sources
Protein Examples

- low fat cheese or cottage cheese
- light yogurt (less than 20g total carbs per serving)
- eggs white or egg beaters
- beans, lentils
- tofu
- fish
- chicken or tuna salad made with light mayo
- lean meat or chicken cooked in broth or vegetable juices
- ground lean meats (90% or higher for lean to fat ratio) -
- Consume moist, soft, ground, diced, or pureed proteins at least 3 - 6 times per day as tolerated for 1 week after liquid diet -
- Chew, chew, chew!
    - You cannot over-chew your food. In this early stage, the muscles in your smaller stomach are not strong enough to properly grind down your food.
    - If you are not a good chewer, grind or even puree your food.
    - To puree foods: Remove skins/cook food if needed.
    - Cut into small, dime-sized pieces and place into blender.
    - Add liquid (broth, skim milk, or water). Pulse until smooth or applesauce consistency.
    - In place of skipping meals, consume a protein drink -
    - Cooking meat in a slow cooker is helpful -
    - Choose low fat dairy products with close to a 1:1 carbohydrate to protein ratio

3 Weeks Post-Op Sample Meal Plan

8:00 AM	3 Tbsp. Egg Whites Multivitamins, B-12, Vitamin D-3, Iron (if taking)
9:00 AM	8 ounces water
10:00 AM	1/2 Protein Drink
11:00 AM	8 ounces water/fluid
12:00 PM	¼ - ½ cup tuna or chicken salad with light mayo; Calcium supplement
1:00 PM	8 ounces water/fluid
2:00 PM	8 ounces water/fluid
3:00 PM	½ cup unsweetened Greek yogurt
4:00 PM	8 ounces water/fluid
5:00 PM	8 ounces water/fluid
6:00 PM	½ tilapia fillet; Calcium supplement
7:00 PM	8 ounces water
8:00 PM	½ cup low fat cottage cheese; 3rd calcium if needed
Nutrition Goals:	Fluid: 72 ounces Protein: 60 to 80 g Calories:

4-6 Weeks Post-Op Sample Meal Plan

8:00 AM	3 Tbsp. egg whites, 1/2 cup applesauce Multivitamins, B-12, Vitamin D-3, Iron (if taking)
9:00 AM	8 ounces water
10:00 AM	1/2 Protein Drink
11:00 AM	8 ounces water/fluid
12:00 PM	1/4-1/2 cup tuna or chicken salad (light mayo), 1/2 cup cooked carrots Calcium supplement
1:00 PM	8 ounces water/fluid
2:00 PM	8 ounces water/fluid
3:00 PM	1/2 Protein Drink
4:00 PM	8 ounces water/fluid
5:00 PM	8 ounces water/fluid
6:00 PM	1/2 tilapia fillet, 1/2 cup well-cooked zucchini Calcium supplement
7:00 PM	8 ounces bone broth
8:00 PM	1/2 cup cottage cheese, 1/2 cup canned peaches in their own juices 3rd calcium if needed
Nutrition Goals:	Fluid: 72 ounces Protein: 60 to 80 g Calories:

6-12 Weeks Post-Op Sample Meal Plan

At 9 weeks post-op, your dietitian will work with you to determine if it is the right time to introduce small amounts of starches or grains

8:00 AM	½ cup unsweetened Greek yogurt with ½ cup blueberries Multivitamins, B12, vitamin D, Iron (if taking)
9:00 AM	8 ounces water
10:00 AM	8 ounces water/fluid. Sugar Free Jello
11:00 AM	8 ounces water/fluid
12:00 PM	3 oz grilled salmon, 1/2 cup zucchini Calcium supplement
1:00 PM	8 ounces water/fluid
2:00 PM	8 ounces water/fluid
3:00 PM	½ cup cottage cheese, ½ cup canned peaches in their own juices
4:00 PM	8 ounces water/fluid
5:00 PM	8 ounces water/fluid
6:00 PM	3 oz grilled chicken, ½ cup cooked spinach, 1/2 cup peas Calcium supplement
7:00 PM	8 ounces fat free broth
8:00 PM	1 low fat cheese stick, 1 small orange 3rd calcium if needed
Nutrition Goals:	Fluid: 72 ounces Protein: 60 to 80 g Calories:

Introducing Fruits and Vegetables

Introduce fruits and vegetables AFTER comfortably eating soft, moist protein foods

- Soft, moist, well-cooked non-starchy vegetables FIRST, then soft, moist fruits
- Avoid fruits and vegetables that are stringy and fibrous and fruits with skins, seeds, or membranes.
- Always eat protein foods first
- Introduce only one food at a time
- Examples of vegetables
  - All cooked to soft texture
  - Broccoli
  - Cauliflower
  - Carrots
  - Green beans
  - Zucchini (peeled)
  - AVOID CORN AND RAW LEAFY GREEN VEGETABLES AT THIS STAGE -
- Examples of soft fruits
  - Melon
  - Cantaloupe
  - Peeled apples or unsweetened applesauce
  - Peeled pears TIP: When trying a new food for the first time after surgery, make sure you are at home in case you do not tolerate it!

Guidelines:

- Meet 100% of your fluid and protein goals.
- Track everything you eat to ensure you are eating enough protein.
- Continue to wait 30 minutes after meals to drink fluids.
- Try to pair a protein food with a vegetable or fruit at meals and snacks.
- Protein drinks if needed. Drink a protein drink instead of skipping meals.
- Meats should be tender and moist. No tough, dry red meat. Do not fry meats.
- Chew foods to applesauce consistency.
- Swallow and breathe before taking the next bite.
- If food feels stuck, do not drink fluids. Instead walk around until feeling subsides.
- Stop eating at first sign of fullness.
- Do not force yourself to eat more.
- Avoid processed foods, fast food, convenience foods, “snack” foods, fried foods, simple sugars, concentrated sweets, high calorie beverages, etc.

Additional Tips

- Pay attention to your body and stop eating at first sign of fullness
- Chew foods well to applesauce consistency, swallow & breathe before taking the next bite
- Leftovers can be saved for the next meal or snack
- Avoid starches such as untoasted bread, rice, cereals, and pasta
- Avoid raw fruits and vegetables with high fibrous consistency (celery stalks, corn, artichokes, tomatoes, pineapple, orange); may consume these pureed, or well-cooked
- If food feels stuck, do not swallow fluids and instead walk around
- Take all recommended vitamins and minerals (multivitamin, vitamin B12, vitamin D3, Calcium Citrate with Vitamin D, and Iron if needed)
- Track your food daily, either with written food logs or with apps such as “Lose it,” “MyFitness Pal,” or “Baritastic”
- Avoid high calorie beverages (juice, milkshakes, soda, sweet tea, lemonade)
- Do not chew gum or suck on hard candy as these can obstruct your outlet if swallowed
- If constipated, you may need a fiber supplement (Benefiber)
- Avoid excessive amounts of caffeine and alcohol as these can cause gastric irritation
- Try to have regular meals and avoid grazing; eating 3 to 6 small frequent meals per day
- Meals should always include protein, then vegetable or fruit, then whole grains (such as whole grain toast, oatmeal, cream of wheat)
- Focus on getting your protein FIRST.
- Raw vegetables and salads are best tolerated 3 months after surgery
- Remember that protein shakes are meal replacements only, do not drink in addition to meals
- Avoid foods with more than 2g of sugar alcohol (sorbitol, mannitol, xylitol, erythritol) per serving. These may contribute to excessive gas, bloating, and/or diarrhea

Supplement Schedule

Protein	• Eat high-protein, low-fat foods (legumes, low fat dairy, egg whites) before consuming vegetables, fruit, or grains • Supplement with protein powder (whey or whey/soy isolate) in milk or other liquid • Aim for an intake of 60 g protein to 130 g protein per day (this will be assigned by your dietitian)
Calcium	• For laparoscopic adjustable gastric banding, sleeve gastrectomy, Roux-en-Y gastric bypass: **1,200 mg a day** • Biliopancreatic diversion, duodenal switch: **1,800 mg per day** • Take calcium supplements separately from iron supplements and iron-containing foods (approximately 2 hours between dosages) • Doses should be separate; calcium carbonate should be taken on an empty stomach, calcium citrate with meals
Vitamin B12	Healthcare provider to monitor vitamin B12 levels and prescribe supplementation with sublingual oral crystalline vitamin B12 (300 mcg/day to 500 mcg/day sublingually), an orally dissolving tablet, nasal spray, or a 1,000-mcg monthly injection as needed
Vitamin D	• Patient to take vitamin D supplements (total of 3,000 international units daily, comprising all supplements including calcium and vitamin D) • If vitamin D3 is deficient, the patient should receive 50,000 international units ergocalciferol (vitamin D2) one time a week for 8 weeks followed by maintenance therapy of 1500-2000 IU/day to achieve normal concentrations. (Dagan, 2017)
Folate	• Maintenance: 400-800 mcg/day, may be present in daily MVI • Women of child-bearing age: 800-1000 mcg/day
Iron	• Take iron separately from calcium to maximize absorption • Avoid foods that contain oxalates (such as spinach, almonds, beets, raspberries) when taking iron supplements. • Menstruating females and patients who have undergone RYGB, SG, or BPD/DS should take at least 45-60 mg of elemental iron daily for maintenance (cumulatively, including iron from all vitamin and mineral supplements) • Iron supplements are best taken with vitamin C to maximize absorption • Monitor for presence of GI symptoms, including nausea and constipation, which may decrease compliance with this supplement
Multivitamin	• Patient to take two multivitamins daily that include iron for maintenance. Chewable or liquid forms are recommended for the first month. Gummy formulations may be labeled “complete” but lack thiamin and iron, so their use should be discouraged. Note: Many bariatric surgery-specific vitamins have bene formulated and are commercially available; many of these products contain additional nutrients, such as vitamin B12 and/or vitamin D. Carefully evaluate products and make appropriate recommendations to meet nutrient needs.

Dumping Syndrome

Dumping Syndrome (bypass; possibly sleeve)

- Caused by the fast rate of emptying ("dumping") of sugary/fatty foods/fluids from the pouch into the “rerouted” small intestine without being properly digested
- Symptoms may include: cramping, vomiting, diarrhea, rapid heartbeat, and/or sweating
- Look for products < 10 g of sugar, < 5 g of fat
  - Avoid foods like ice cream, cake, cookies, sweet tea, sugar, candy, fried food
- Yogurt, milk and fruit all have natural sugar; these should not cause dumping when consumed in moderate amounts
- Two types of dumping:
  - Early dumping: occurs 10-30 minutes after a meal
  - Late dumping: occurs 1-3 hours after a meal
- Treatment:
  - Separate liquids from meal time
  - Eat smaller meals
  - Lie down after a meal to help control the symptoms
  - Choose complex carbohydrates such as whole grains over simple carbohydrates
  - Addition of more protein and fat to your meals
- Talk to your healthcare provider if you do experience symptoms of dumping syndrome

Leptin and Ghrelin

Leptin is considered a “satiety hormone” that reduces appetite and makes you feel full. As a signaling hormone, its role is to communicate with the hypothalamus, the portion of your brain that regulates appetite and food intake. Unfortunately, in obesity the leptin system doesn’t work as it should. This is referred to as leptin resistance.

Here are a few suggestions for improving leptin sensitivity:

- Avoid inflammatory foods: Limit foods that cause inflammation, especially sugary drinks and trans fats.
- Eat certain foods: Eat more anti-inflammatory foods, such as fatty fish.
- Exercise regularly: Moderate activity can improve leptin sensitivity.
- Get enough sleep: Studies have shown that insufficient sleep leads to a drop in leptin levels and increased appetite.
- Supplements: Not only is correcting any deficiencies medically important to your overall health, these deficiencies may also be a contributing factor to obesity and pre-diabetes.

Ghrelin is known as a “hunger hormone.” When your stomach is empty, it releases ghrelin, which sends a message to the hypothalamus telling you to eat. However, in overweight and obese people, fasting ghrelin levels are often lower than in people of normal weight. Studies have also shown that after obese people eat a meal, ghrelin only decreases slightly. Because of this, the hypothalamus doesn’t receive as strong of a signal to stop eating, which can lead to overeating.

Here are a few tips to improve the function of ghrelin:

- Sugar: Avoid high-fructose corn syrup and sugar-sweetened drinks, which can impair ghrelin response after meals .
- Protein: Eating protein at every meal, especially breakfast, can reduce ghrelin levels and promote satiety.

Physical Activity

Physical activity preserves lean body mass and decreases the risk of blood clots

- Start walking the day of surgery, increasing as tolerated
  - Goal is 30-60 minutes, 5 times per week
- Add resistance training only after being cleared by your surgeon
  - Goal is 2-3 times per week
- Move frequently throughout the day in accordance with medical advice regarding your history of knee pain/surgeries.

Remember - Even 5 minutes of movement every hour while awake can add up to a total of 60 mins or one full hour of exercise daily in a 12 hour day! Just do anything you can and do it daily in small increments.

Your muscles need energy to work or exercise. To feed your muscles, your body burns sugar as an energy source, which in turn lowers the sugar levels in your blood. When you exercise regularly, it helps your body use insulin more efficiently which can lower your blood sugar levels for up to 12 hours after you exercise!

Tips for Success After Surgery

Surgery will help you control the number of calories you consume by making it difficult for you to eat large portions of food at one time. IT IS STILL POSSIBLE FOR PEOPLE TO OVEREAT AND GAIN WEIGHT BY EATING AND/OR DRINKING HIGH CALORIE ITEMS THROUGHOUT THE DAY.
This behavior is sometimes referred to as grazing. Try some of these eating tips to stay on track:

- Keep nibbling (grazing) to a minimum. Continuous nibbling and snacking on high calorie foods and beverages can cause you to gain weight.
- Do your best to make healthy choices. - Follow a balanced meal plan with adequate protein and fluids, and daily intake of vegetables, fruit, and healthy fats.
- Be aware of why you are eating- eating because of boredom, depression, anxiety, happiness, or just something to do can result in weight gain.
- Some people find it helpful to involve a therapist to help deal with an emotional dependence on eating. - Practice mindful eating (i.e. being “present” when eating; slow, purposeful chewing; paying attention to taste, texture; awareness of level of hunger and fullness)
- Eat slowly and listen to your body. Stop eating when you are no longer hungry, instead of when you are full. Don’t eat while distracted by other things, like the television or computer.
- Eat at regular times throughout the day to avoid feeling deprived/famished
- Avoid drinking fluids with meals; wait 20-30 minutes after meals for pouch or sleeve to empty -
- Stay active. Exercise helps control your appetite, can relieve stress, and can improve quality of life in general.
- Take your vitamins. After surgery you will be on a diet that cannot meet your needs for all vitamins and minerals. Be sure to take your recommended supplements every day, even if you feel good! -
- Go grocery shopping with a list and stick to the list
- Avoid high-calorie fluids including regular juices, soft drinks, and whole milk - Have nutrition-related laboratory values checked annually - Attend annual follow-ups with your dietitian

Eating Out

- Ask, ask, ask as much as you can about how the food you're ordering will be prepared. Restaurants are notorious for dousing even the simplest things in spices, salts and marinades before cooking. Plain baked potatoes are often rolled in salt before baked which seems unnecessary since many don't eat the skin in the first place.
- Locally-owned restaurants tend be low-volume and usually cook food to order, so they usually have a tendency to be more accommodating for customer requests. Don't hesitate to ask questions or request your food to be prepared plain.
- Pass on the sauce that accompanies your entry or ask for it to be served on the side. Many sauces are high in sodium and not worth the negative health effects they can lead to.
- Stick to the basics when it comes to healthy proteins that are grilled, baked or roasted and steer clear of casseroles and pasta dishes. These dishes tend to be high in fat and sodium content and can rally thwart your post-surgery weight loss success.
- Taste your foods before you reach for the salt shaker. Often, food already has enough taste and doesn't need additional salt, but people never know because they sprinkle salt on it before even trying the food.
- Skip condiments such as ketchup, mustard and salsa. They may be low in calories but all contain high amounts of sodium, so it's best to use them sparingly.
- **A note on alcohol:**
    - Alcohol is a gastric irritant and cause stomach discomfort and pain. It can be very high in calories, especially when mixers are used; these are empty calories with no nutritional value and can lead to weight gain.
    - It may also increase the risk of ulcer formation. Alcohol metabolism is altered after surgery, and you may get drunk very quickly. It is recommended to avoid alcohol after surgery. For your safety, if you choose to have alcohol after surgery, make sure the first time you drink, you are at home and with someone who can help if needed

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Nutrition Care Manual

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