## Pre-Op Biochem + Foods

### **Pre-Surgery Nutrition: Fortifying the Body for Optimal Repair**

Preparing the body before surgery with the right nutrients can significantly enhance healing and recovery. The focus is on supporting immune function, reducing inflammation, strengthening tissue integrity, and providing the necessary building blocks for rapid repair. Below is a **comprehensive and organized list** of nutrients and foods to consume before surgery, with detailed explanations of their biochemical roles.

### **1. Support for Immune Function**

A robust immune system ensures the body can fight off infections and manage inflammation effectively during and after surgery.

#### **Key Nutrients and Foods:**

* **Vitamin C:**
  + **Biochemistry:** Enhances white blood cell production and function, and acts as an antioxidant to protect immune cells.
  + **Foods:** Oranges, grapefruits, kiwis, strawberries, guava, papaya, red bell peppers, broccoli, kale, and Brussels sprouts.
* **Vitamin D:**
  + **Biochemistry:** Modulates immune response by enhancing antimicrobial peptides and reducing inflammation.
  + **Foods:** Salmon, sardines, mackerel, egg yolks, fortified plant-based milks, and mushrooms (sun-exposed).
* **Zinc:**
  + **Biochemistry:** Supports DNA synthesis, T-cell production, and wound healing processes.
  + **Foods:** Pumpkin seeds, oysters, cashews, chickpeas, quinoa, sesame seeds, lentils, and crab.
* **Probiotics and Prebiotics:**
  + **Biochemistry:** Support gut-associated lymphoid tissue (GALT), a key component of immune function.
  + **Foods:** Yogurt, kefir, sauerkraut, kimchi, miso, tempeh, garlic, onions, bananas, and Jerusalem artichokes.
* **Selenium:**
  + **Biochemistry:** A cofactor for glutathione peroxidase, a critical enzyme in reducing oxidative stress and supporting immune resilience.
  + **Foods:** Brazil nuts, tuna, sardines, sunflower seeds, and whole grains.

### **2. Anti-Inflammatory Support**

Reducing systemic inflammation before surgery can minimize post-operative swelling and complications.

#### **Key Nutrients and Foods:**

* **Omega-3 Fatty Acids:**
  + **Biochemistry:** EPA and DHA act as precursors to resolvins and protectins, which resolve inflammation.
  + **Foods:** Salmon, mackerel, sardines, chia seeds, flaxseeds, walnuts, and hemp seeds.
* **Polyphenols:**
  + **Biochemistry:** Reduce the activity of inflammatory enzymes like COX-2 and inhibit free radical damage.
  + **Foods:** Green tea, dark chocolate (85% cacao or higher), blueberries, blackberries, cherries, turmeric, and olive oil.
* **Curcumin:**
  + **Biochemistry:** Suppresses NF-κB signaling, a key pathway in inflammation.
  + **Foods:** Turmeric (combine with black pepper to enhance bioavailability), ginger.
* **Gingerol:**
  + **Biochemistry:** Inhibits prostaglandin synthesis, reducing inflammation.
  + **Foods:** Fresh ginger, ginger tea, candied ginger (unsweetened).
* **Flavonoids:**
  + **Biochemistry:** Modulate inflammatory cytokines and enhance capillary health.
  + **Foods:** Onions, citrus fruits, parsley, and dark green vegetables.

### **3. Strengthening Tissue Integrity (Collagen Synthesis)**

Collagen synthesis is critical for maintaining skin, blood vessels, and connective tissues during and after surgery.

#### **Key Nutrients and Foods:**

* **Vitamin C:**
  + **Biochemistry:** Essential cofactor for proline and lysine hydroxylation in collagen synthesis.
  + **Foods:** Red bell peppers, citrus fruits, tomatoes, guava, kale, and broccoli.
* **Amino Acids (Glycine, Proline, Lysine):**
  + **Biochemistry:** Serve as the primary building blocks of collagen.
  + **Foods:** Bone broth, chicken, turkey, eggs, tofu, cottage cheese, spirulina, and gelatin.
* **Sulfur:**
  + **Biochemistry:** Supports cross-linking of collagen fibers and strengthens tissue.
  + **Foods:** Garlic, onions, cruciferous vegetables (broccoli, cauliflower, Brussels sprouts), and eggs.
* **Silica:**
  + **Biochemistry:** Promotes collagen stability and connective tissue formation.
  + **Foods:** Oats, bananas, leeks, asparagus, and cucumbers (with the skin).
* **Copper:**
  + **Biochemistry:** Cofactor for lysyl oxidase, an enzyme required for collagen cross-linking.
  + **Foods:** Shellfish (oysters, crab), cashews, sesame seeds, and dark chocolate.

### **4. Antioxidant Defense**

Antioxidants reduce oxidative stress, which is elevated during surgery and can impair healing.

#### **Key Nutrients and Foods:**

* **Vitamin E:**
  + **Biochemistry:** Protects cell membranes from oxidative damage and supports immune function.
  + **Foods:** Almonds, sunflower seeds, avocados, spinach, and wheat germ.
* **Beta-Carotene:**
  + **Biochemistry:** A precursor to vitamin A, which supports epithelial cell health and immune response.
  + **Foods:** Sweet potatoes, carrots, cantaloupe, spinach, and kale.
* **Polyphenols:**
  + **Biochemistry:** Scavenge free radicals and reduce oxidative stress markers.
  + **Foods:** Pomegranates, green tea, blueberries, cranberries, and red grapes.
* **Selenium:**
  + **Biochemistry:** Boosts glutathione peroxidase activity, neutralizing free radicals.
  + **Foods:** Brazil nuts, sunflower seeds, whole grains, and fish.

### **5. Optimizing Blood Health (Hemostasis and Oxygenation)**

Supporting blood clotting and oxygen transport ensures better outcomes during surgery and accelerates recovery.

#### **Key Nutrients and Foods:**

* **Vitamin K:**
  + **Biochemistry:** Essential for activating clotting factors and maintaining blood vessel integrity.
  + **Foods:** Kale, spinach, Swiss chard, parsley, Brussels sprouts, and asparagus.
* **Iron:**
  + **Biochemistry:** Crucial for hemoglobin production, which delivers oxygen to tissues.
  + **Foods:** Red meat, liver, spinach, lentils, tofu, quinoa, and fortified cereals.
* **Copper:**
  + **Biochemistry:** Required for iron metabolism and red blood cell formation.
  + **Foods:** Shellfish, sunflower seeds, sesame seeds, and cashews.
* **Folate, Vitamin B6, and Vitamin B12:**
  + **Biochemistry:** Support red blood cell production and DNA synthesis.
  + **Foods:** Leafy greens (folate), chicken (B6), salmon and eggs (B12).

### **6. Energy and Macronutrient Support**

Energy is vital to fuel the metabolic processes required for healing.

#### **Key Nutrients and Foods:**

* **Complex Carbohydrates:**
  + **Biochemistry:** Provide a steady supply of glucose for cellular energy.
  + **Foods:** Sweet potatoes, quinoa, brown rice, oats, and whole-grain bread.
* **Healthy Fats:**
  + **Biochemistry:** Provide essential fatty acids and energy for repair processes.
  + **Foods:** Avocados, olive oil, nuts (almonds, walnuts), and seeds (chia, flax).
* **Proteins:**
  + **Biochemistry:** Provide amino acids for tissue repair and immune function.
  + **Foods:** Chicken, turkey, eggs, tofu, lentils, and Greek yogurt.

### **7. Hydration and Electrolyte Support**

Proper hydration is crucial for nutrient transport and cellular function.

#### **Key Foods and Beverages:**

* **Coconut Water:**
  + **Biochemistry:** Rich in potassium and electrolytes for maintaining cellular hydration.
* **Herbal Teas:**
  + **Biochemistry:** Chamomile or peppermint tea can reduce pre-surgery stress and inflammation.
* **Hydration Foods:**
  + **Biochemistry:** Water-rich foods like cucumber, watermelon, celery, and oranges maintain fluid balance.

### **Sample Pre-Surgery Meal Plan:**

* **Breakfast:** Spinach and mushroom omelet with avocado and a side of orange slices.
* **Snack:** Handful of almonds and a cup of green tea.
* **Lunch:** Grilled salmon with quinoa and steamed broccoli.
* **Snack:** Greek yogurt with blueberries and flaxseeds.
* **Dinner:** Bone broth-based soup with chicken, kale, and sweet potatoes.
* **Hydration:** Coconut water and chamomile tea throughout the day.

Here is an **expanded and highly detailed list** of foods for each nutrient category to optimize the body for rapid healing post-surgery. This includes an even greater variety of options, with the biochemical reasoning and expanded lists to provide flexibility in food choices.

### **1. Support for Immune Function**

#### **Key Nutrients and Expanded Food List:**

* **Vitamin C:**
  + **Biochemistry:** Enhances white blood cell (WBC) activity and antioxidant protection to reduce immune-related oxidative stress.
  + **Foods:**
    - Fruits: Oranges, grapefruits, kiwis, guava, papaya, pineapples, mangoes, strawberries, blueberries, raspberries, blackcurrants, acerola cherries.
    - Vegetables: Red bell peppers, green bell peppers, kale, broccoli, Brussels sprouts, snow peas, spinach, and parsley.
* **Vitamin D:**
  + **Biochemistry:** Enhances antimicrobial peptides and promotes balanced immune responses.
  + **Foods:**
    - Fatty Fish: Salmon, mackerel, sardines, herring, tuna.
    - Fortified Foods: Fortified almond milk, soy milk, orange juice, and cereals.
    - Other Sources: Egg yolks, mushrooms (exposed to sunlight, like shiitake or portobello).
* **Zinc:**
  + **Biochemistry:** Regulates WBC proliferation and macrophage activity, which are critical for infection control and tissue repair.
  + **Foods:**
    - Animal Sources: Oysters (highest source), crab, lobster, beef, pork, lamb, and chicken.
    - Plant Sources: Pumpkin seeds, sunflower seeds, sesame seeds, quinoa, lentils, chickpeas, hemp seeds, cashews, almonds, and whole grains.
* **Probiotics and Prebiotics:**
  + **Biochemistry:** Probiotics support gut-associated lymphoid tissue (GALT), which contributes up to 70% of the immune system, while prebiotics feed beneficial bacteria.
  + **Foods:**
    - Probiotic Foods: Yogurt (live cultures), kefir, sauerkraut, kimchi, miso, tempeh, natto, kombucha, pickled vegetables.
    - Prebiotic Foods: Garlic, onions, leeks, bananas, Jerusalem artichokes, asparagus, dandelion greens, chicory root.
* **Selenium:**
  + **Biochemistry:** Critical for antioxidant enzymes like glutathione peroxidase, which neutralizes free radicals and supports immunity.
  + **Foods:** Brazil nuts (one nut contains your daily selenium needs!), tuna, halibut, sardines, sunflower seeds, whole grains, shiitake mushrooms, and eggs.

### **2. Anti-Inflammatory Support**

#### **Key Nutrients and Expanded Food List:**

* **Omega-3 Fatty Acids:**
  + **Biochemistry:** EPA and DHA from omega-3s resolve inflammation by producing specialized pro-resolving mediators like resolvins and protectins.
  + **Foods:**
    - Fatty Fish: Salmon, mackerel, sardines, herring, trout, cod, and Arctic char.
    - Plant Sources: Chia seeds, flaxseeds, walnuts, hemp seeds, and seaweed (e.g., nori, wakame).
* **Polyphenols:**
  + **Biochemistry:** Reduce inflammatory cytokine production and neutralize free radicals.
  + **Foods:**
    - Beverages: Green tea, matcha, black tea, hibiscus tea, and pomegranate juice.
    - Fruits: Blueberries, cherries, cranberries, elderberries, pomegranates, apples, and grapes.
    - Vegetables: Red onions, purple carrots, and eggplants.
    - Others: Dark chocolate (85% cacao or higher) and extra virgin olive oil.
* **Curcumin (from Turmeric):**
  + **Biochemistry:** Reduces inflammatory pathways by inhibiting NF-κB, a key mediator of inflammation.
  + **Foods:** Fresh turmeric root, ground turmeric (use in teas, soups, or curries). Combine with black pepper and healthy fats (like olive oil or coconut oil) to enhance absorption.
* **Gingerol (from Ginger):**
  + **Biochemistry:** Blocks prostaglandin synthesis to reduce swelling and inflammation.
  + **Foods:** Fresh ginger root, ginger tea, candied ginger (unsweetened), and powdered ginger for cooking.
* **Flavonoids:**
  + **Biochemistry:** Stabilize blood vessel integrity and reduce inflammatory enzyme activity.
  + **Foods:** Citrus fruits (oranges, lemons, limes, grapefruits), parsley, capers, and dark leafy greens.

### **3. Strengthening Tissue Integrity (Collagen Synthesis)**

#### **Key Nutrients and Expanded Food List:**

* **Vitamin C:**
  + **Biochemistry:** Activates enzymes like prolyl hydroxylase and lysyl hydroxylase, essential for collagen cross-linking.
  + **Foods:** (See immune function list above for an expanded list of vitamin C foods).
* **Amino Acids (Glycine, Proline, Lysine):**
  + **Biochemistry:** Serve as the structural backbone for collagen molecules.
  + **Foods:**
    - Animal-Based Sources: Bone broth, chicken skin, pork rinds, beef, eggs, and fish.
    - Plant-Based Sources: Soy protein, lentils, tofu, black beans, spirulina, and chia seeds.
* **Sulfur:**
  + **Biochemistry:** Supports the cross-linking of collagen fibers, ensuring tensile strength.
  + **Foods:** Garlic, onions, leeks, cruciferous vegetables (broccoli, Brussels sprouts, cauliflower, cabbage), radishes, and eggs.
* **Silica:**
  + **Biochemistry:** Plays a role in collagen stabilization and connective tissue repair.
  + **Foods:** Oats, millet, barley, leeks, cucumbers (with skin), celery, and bell peppers.
* **Copper:**
  + **Biochemistry:** Cofactor for lysyl oxidase, an enzyme essential for collagen cross-linking.
  + **Foods:** Shellfish (oysters, crab, shrimp), sesame seeds, cashews, sunflower seeds, dark chocolate, chickpeas, and mushrooms.

### **4. Antioxidant Defense**

#### **Key Nutrients and Expanded Food List:**

* **Vitamin E:**
  + **Biochemistry:** Neutralizes free radicals and protects cell membranes from oxidative damage.
  + **Foods:** Sunflower seeds, almonds, hazelnuts, avocados, spinach, wheat germ, olive oil, and peanuts.
* **Beta-Carotene (Vitamin A Precursor):**
  + **Biochemistry:** Supports epithelial cell repair and boosts immunity.
  + **Foods:** Carrots, sweet potatoes, pumpkin, cantaloupe, apricots, mangoes, kale, and spinach.
* **Polyphenols:**
  + **Biochemistry:** Fight oxidative stress and inflammation.
  + **Foods:** (See polyphenol list under anti-inflammatory foods for expanded options).
* **Selenium:**
  + **Biochemistry:** Protects against oxidative damage via glutathione peroxidase.
  + **Foods:** (See immune function selenium list for expanded options).

### **5. Optimizing Blood Health (Hemostasis and Oxygenation)**

#### **Key Nutrients and Expanded Food List:**

* **Vitamin K:**
  + **Biochemistry:** Required for clotting factor activation and wound stability.
  + **Foods:** Leafy greens (spinach, kale, Swiss chard, mustard greens, collards), broccoli, parsley, asparagus, and green beans.
* **Iron:**
  + **Biochemistry:** Essential for hemoglobin production and oxygen delivery to tissues.
  + **Foods:**
    - Animal-Based: Red meat, liver, turkey, chicken, and eggs.
    - Plant-Based: Spinach, lentils, tofu, tempeh, kidney beans, fortified cereals, and pumpkin seeds (pair with vitamin C-rich foods for better absorption).
* **Copper:**
  + **Biochemistry:** Supports iron metabolism and collagen cross-linking.
  + **Foods:** (See copper list above for expanded options).
* **Folate, Vitamin B6, and Vitamin B12:**
  + **Biochemistry:** Essential for red blood cell formation and DNA synthesis.
  + **Foods:** Leafy greens (folate), bananas, poultry (B6), salmon, eggs, beef liver, fortified nutritional yeast (B12).

### **6. Energy and Macronutrient Support**

#### **Key Foods:**

* **Complex Carbohydrates:**
  + **Foods:** Sweet potatoes, yams, brown rice, quinoa, oats, barley, farro, whole-grain bread, legumes (lentils, chickpeas, black beans).
* **Healthy Fats:**
  + **Foods:** Avocados, olive oil, coconut oil, ghee, nuts (almonds, walnuts, pecans), seeds (chia, flax, sunflower), and fatty fish (salmon, sardines).
* **Proteins:**
  + **Foods:** Chicken, turkey, lean beef, pork, eggs, Greek yogurt, cottage cheese, tofu, tempeh, lentils, edamame, and quinoa.

### **7. Hydration and Electrolyte Support**

#### **Key Foods and Beverages:**

* **Coconut Water:** Natural source of potassium and electrolytes.
* **Herbal Teas:** Chamomile (anti-inflammatory), peppermint (digestion), hibiscus (antioxidant).
* **High-Water Content Foods:** Cucumbers, watermelon, celery, oranges, cantaloupe, and zucchini.

This expanded list ensures a wide variety of foods and flavors while targeting the precise biochemical needs for pre-surgical fortification.