Today’s Topics

• Understand the long-term nutritional consequences associated with bone marrow transplantation (BMT).

• Gain practical skills and tools to maintain a healthy diet and reduce the risk of developing metabolic syndrome.
Transplant Survival

- Survival rates have increased
- Therefore, long-term and late effects are of increasing importance
- Metabolic syndrome is becoming a common late effect, impacting
  - life expectancy
  - quality of life
What is Metabolic Syndrome?

• Metabolic syndrome
  – metabolic factors
    • biochemical processes involved in the body’s normal functioning
  – associated with increased risk for
    • diabetes
    • cardiovascular disease

Over 50 million Americans have metabolic syndrome
Definition of Metabolic Syndrome

Presence of at least 3 of the 5 defining characteristics:

- Apple vs. pear fat distribution
- High blood fats
- Low HDL ("good") cholesterol
- High blood pressure/on medications
- High fasting blood sugar/on medications
Metabolic Syndrome in BMT Patients

86 survivors at one year post-transplant:

- 3:1 frequency of developing:
  - metabolic syndrome
  - high blood pressure
  - high blood fats

- **Not** associated with:
  - age, gender, donor source
  - conditioning regimen, intensity
  - chronic GVHD
  - exposure to steroids (prednisone) or calcineurin inhibitors (cyclosporine; tacrolimus)

*Majhail NS, et al., Bone Marrow Transplant. 2009;43:49-54.*
85 survivors (>5 years) with no GVHD:

- Median: 9 years post-transplant
- 35% had developed metabolic syndrome
- Higher blood insulin and leptin levels in survivors with metabolic syndrome

Annaloro C, et al., Bone Marrow Transplant. 2008;41:797-804.
Metabolic Syndrome in BMT Patients

1,089 transplant survivors (>2 years) vs. 383 controls:

- 4x more likely to develop diabetes
- 2x more likely to have high blood pressure
- History of GVHD had no impact

689 pediatric survivors >5 years post-transplant:

- 15% developed high blood pressure
  - 11-17 year olds:
    - 10% with hypertension ($3\times$ general population)
  - 18-29 year olds:
    - 14% with hypertension ($2\times$ general population)

Metabolic Syndrome in Pediatric BMT Patients

748 long-term pediatric transplant survivors:

- Median: 11 years post-transplant
- $3x$ higher incidence of diabetes mellitus

Diet and Metabolic Syndrome Post-transplant

- High sugar foods
- Low fiber foods
- Processed foods
- High intake of chemically changed fats

High Calorie Intake

leads to:

Obesity
- Diabetes
- Blood Pressure
- Heart Disease
How to Reduce Incidence of Metabolic Syndrome Post-transplantation

• Maintain a healthy weight
• Avoid trans fats
• Include omega-3 fatty acids
• Eat more plant proteins
• Eat an abundance of fruits and vegetables
• Choose whole foods
• Avoid high sugar-containing foods and drinks
• Include new foods
• Load up on herbs and spices
• Exercise regularly
Maintain a Healthy Weight

- Be as lean as possible
- Body mass index (BMI):
  \[ \text{BMI} = \frac{\text{weight in kilograms}}{\text{height in meters}^2} \]
  - Underweight = <18.5
  - **Normal weight** = 18.5–24.9
  - Overweight = 25–29.9
  - Obesity = BMI of 30 or greater
Avoid Trans Fats

• Excessive consumption can lead to cardiovascular disease
• Recommend 1% of total calories (~2 g or less)
• Sources:
  - margarine and vegetable shortening and products made with them:
    • fast food
    • doughnuts, muffins, cakes, pastries, cookies
    • frostings, pie crusts, ready-to-bake biscuits
    • fried foods
• Better choices: olive oil; unrefined coconut oil
Include Omega-3 Fatty Acids

- **Wild**, cold-water fish such as:
  - bluefin and albacore tuna
  - mackerel
  - sardines
  - wild salmon

- Meats and dairy products from grass-fed animals

- Omega-3 eggs

- Dark leafy green vegetables
Include Omega-3 Fatty Acids

- Nuts
  - macadamia
  - walnuts
- Soybeans (edamame) and tofu
  - not soy isolates (e.g., soy protein powders)
- Seeds
  - flax
  - pumpkin
- Oils
  - flaxseed
  - hemp
  - walnut
  - wheat germ
Eat More Plant Proteins

- **Legumes**
  - great source of plant proteins
  - antioxidants, fiber, vitamins, and minerals
- **Garbanzo beans, kidney beans, soybeans, black beans, lentils, dried peas, lima beans, broad beans**
  - To minimize flatulence and bloating:
    - soak
    - add kombu
    - Beano®
Eat an Abundance of Fruits and Vegetables

• 2/3 of your plate should include plant-based foods

• Consume at least 4 cups (raw and cooked) daily

• “Rainbow” of colors
  – myriad of phytochemicals
  – green leafy, cabbage family
  – berries, citrus fruits
Choose Whole Foods

What is a whole food?

- It contains all or most of the original edible parts (whole grain bread vs. white bread)
- It has had very little done to it (little processing)
- It has not been fortified, enriched, bleached, refined, injected, hydrogenated, irradiated, dehydrated, etc.
Choose Whole Foods

• Processed and refined foods contain many artificial ingredients
• Chemical cuisine
• Fast foods
Avoid High Sugar-Containing Foods and Drinks

- Cookies, “health” bars, and candy
- Sodas, sweetened iced teas, and coffee drinks
- Vitamin, energy, and electrolyte drinks
- Commercial condiments
- Sweetened yogurts
Include New Foods

• Add ground flaxseeds to oatmeal or yogurt
• Add chopped kale or dark greens to soups, salads, or smoothies
• Vary hummus: use white beans, edamame, or lentils
• Snack on roasted pumpkin seeds
• Add chopped walnuts to salad or hot cereal
• Make salad dressings with olive or flaxseed oils
• For meat-eaters, choose grass-fed meats and wild fish
Load Up on Herbs and Spices

- Some herbs and spices contain cancer fighting compounds
  - Ginger
  - Turmeric
  - Curry
  - Cinnamon
  - Rosemary
  - Basil
  - Garlic
Exercise Regularly

• Aim for at least 30 minutes of moderate physical activity on most days of the week or — best of all — at least 30 minutes every day

• Regular physical activity can help to promote weight maintenance and help to achieve physical and cardiovascular fitness
Internet Resources

• American Institute for Cancer Research
  www.aicr.org

• The Cancer Fighting Kitchen
  www.rebeccakatz.com

• The World’s Healthiest Foods
  www.whfoods.com
Summary

• Metabolic syndrome is a common finding in transplant survivors

• Lifestyle changes including diet modifications and regular aerobic exercise may help to lower risk of metabolic syndrome
Summary

- Our every day lives – what we eat, drink, do, breathe, and believe – are powerful modulators of our health continuum.

- Eat whole foods- mostly plant-based- in moderation!
Avocado Oatmeal Breakfast Cookies

These cookies made with avocado, whole grains, cinnamon, and dates make for a delicious and healthy on-the-go breakfast!

**Amount Per Serving:** Calories: 160, Total Fat: 6 g, Saturated Fat: 1 g, Trans Fat: 0 g, Cholesterol: 25 mg, Sodium: 250 mg, Carbohydrates: 25 g, Total Sugars: 11 g, Protein: 4 g.
THANK YOU