

# Living with an MPN

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# Objectives

- Overview of what is an MPN
- Symptoms of MPN
- Managing with your healthcare
- Physical and Nutritional information
- MPN resources
- Questions and Discussion

# Myeloproliferative Neoplasms (MPNs) Are Rare

**Polycythemia Vera (PV):**  
About 100,000 people in  
the US

**Essential  
Thrombocythemia (ET):**  
About 71,000 to 88,000  
people in the US

**Myelofibrosis (MF):**  
About 16,000 to  
18,500 people  
in the US

# Understanding the Name: MPN

## Myeloproliferative

**Pronunciation:** my-e-lo-pro-lif-er-a-tive

***myelos***—Greek word meaning bone marrow

***proliferative***—Greek word meaning growing or reproducing rapidly

**Definition:**

Increased growth of blood cells in the bone marrow

## Neoplasm

**Pronunciation:** neo-plasm

***neo***—Greek word meaning new

***plasm***—Greek word meaning formation

**Definition:**

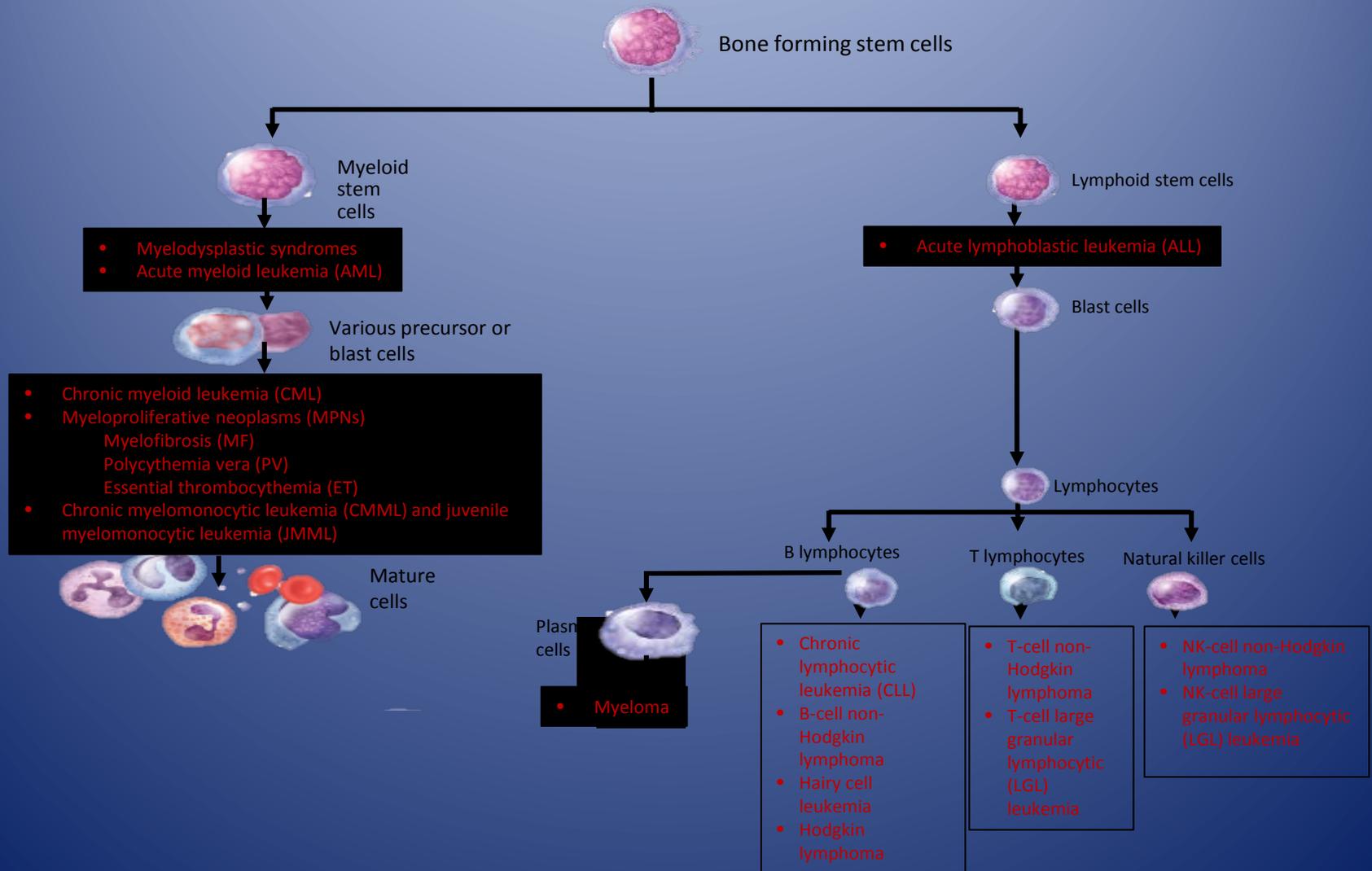
Out-of-control growth of cells serving no physiological function

neoplasm = abnormal growth of cells  
cancer = abnormal growth of cells

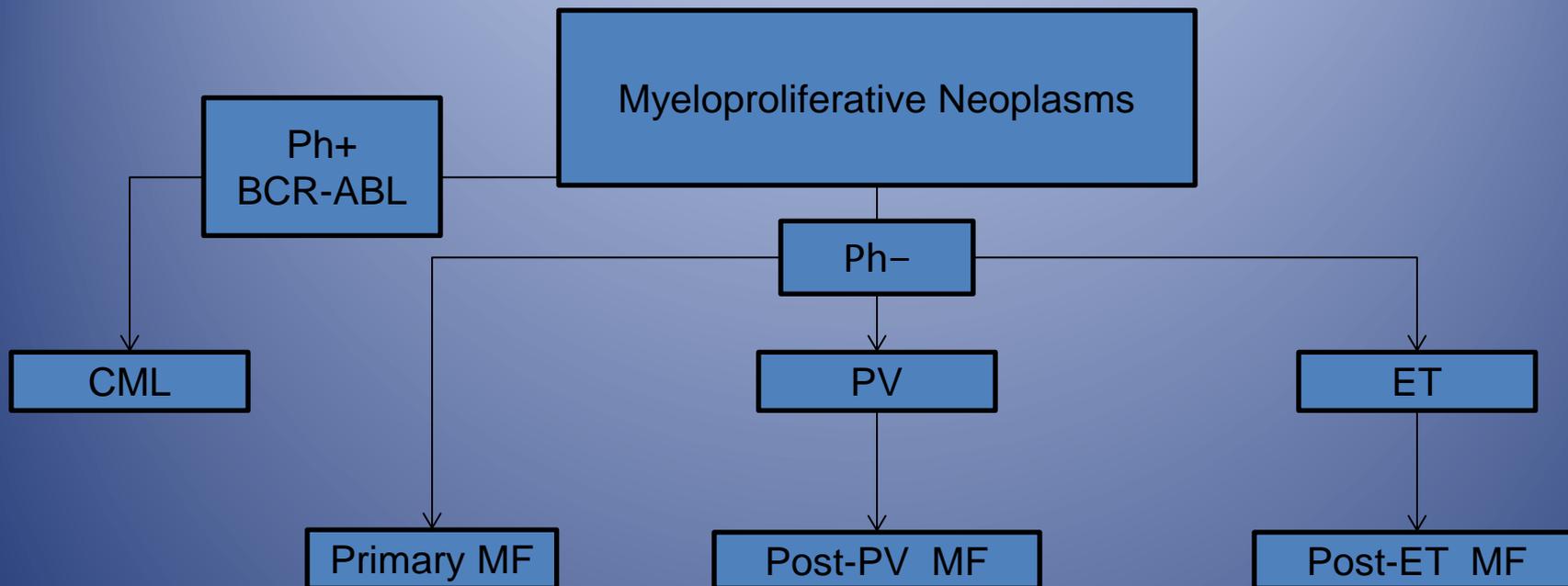
To find patient-friendly medical definitions online, look for:  
**MedlinePlus Dictionary**



**Blood cancers can develop in many different places within normal blood cell formation.**  
 The type of blood cancer that results has to do with where normal cell development is blocked.  
 This picture shows the cell type where different blood cancers arise.



# Classical Myeloproliferative Neoplasms



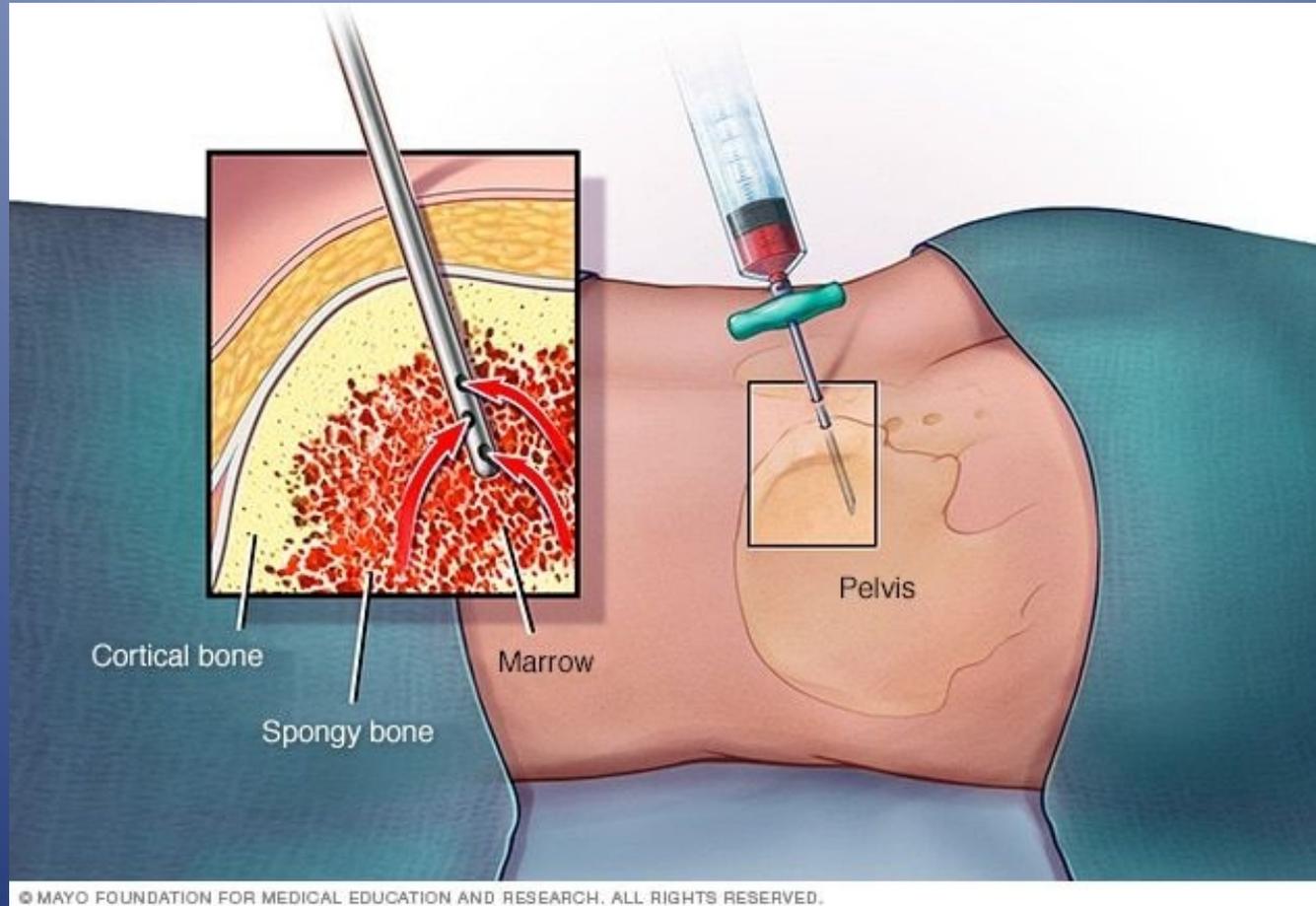
Myelofibrosis encompasses three distinct entities:

- Primary myelofibrosis (1 per 100,000 /year)
- Post-PV myelofibrosis - ~ 10% transformation rate per 10 years (0.3-0.7 per 100,000)
- Post-ET myelofibrosis ~ 4% transformation rate per 10 years (0.5-1.1 per 100,000)

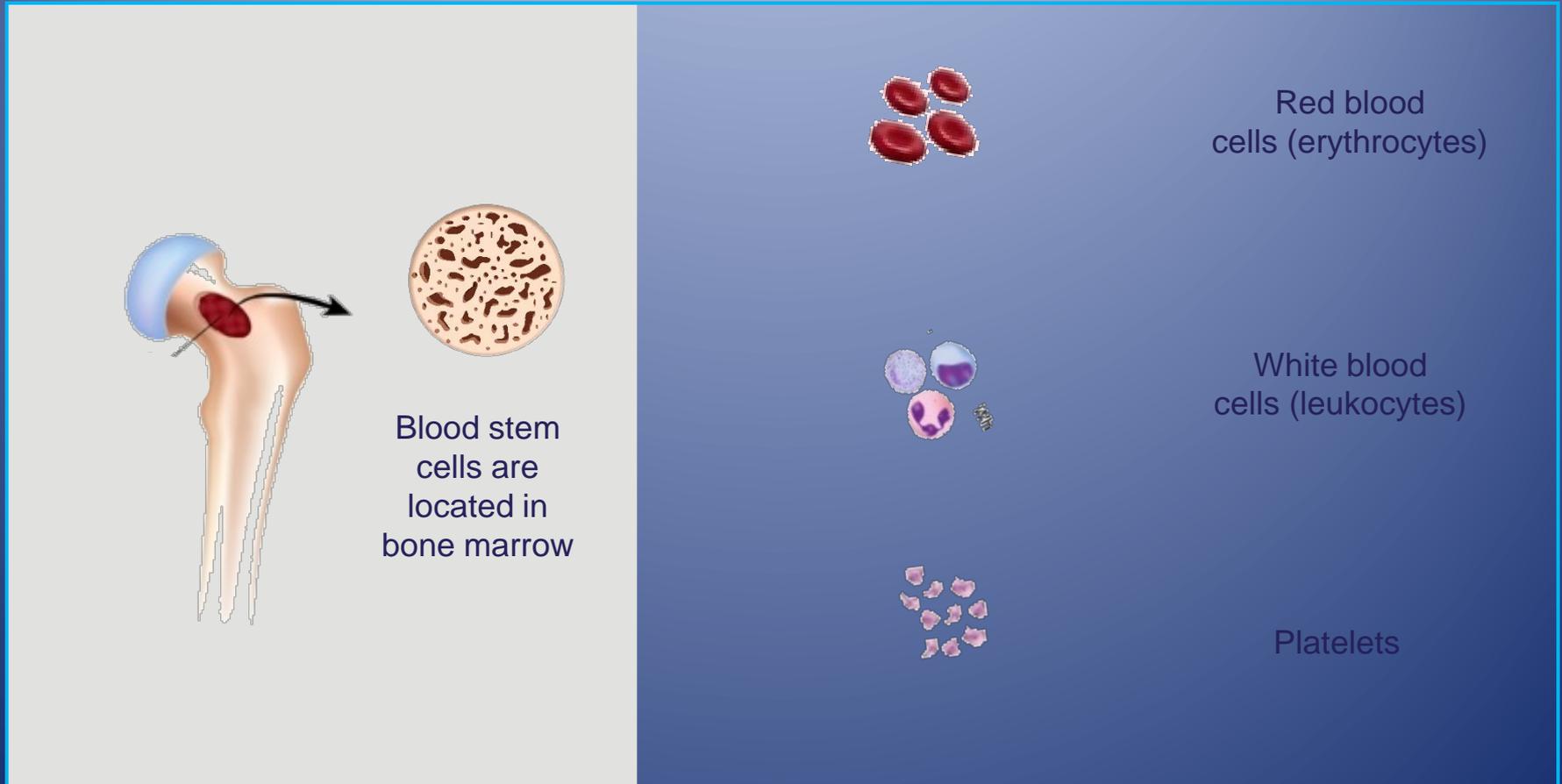
Estimated prevalence: 16,000-18,500 cases in the United States

Median age at diagnosis: 67 years (range 42-84)

# Bone Marrow Biopsy

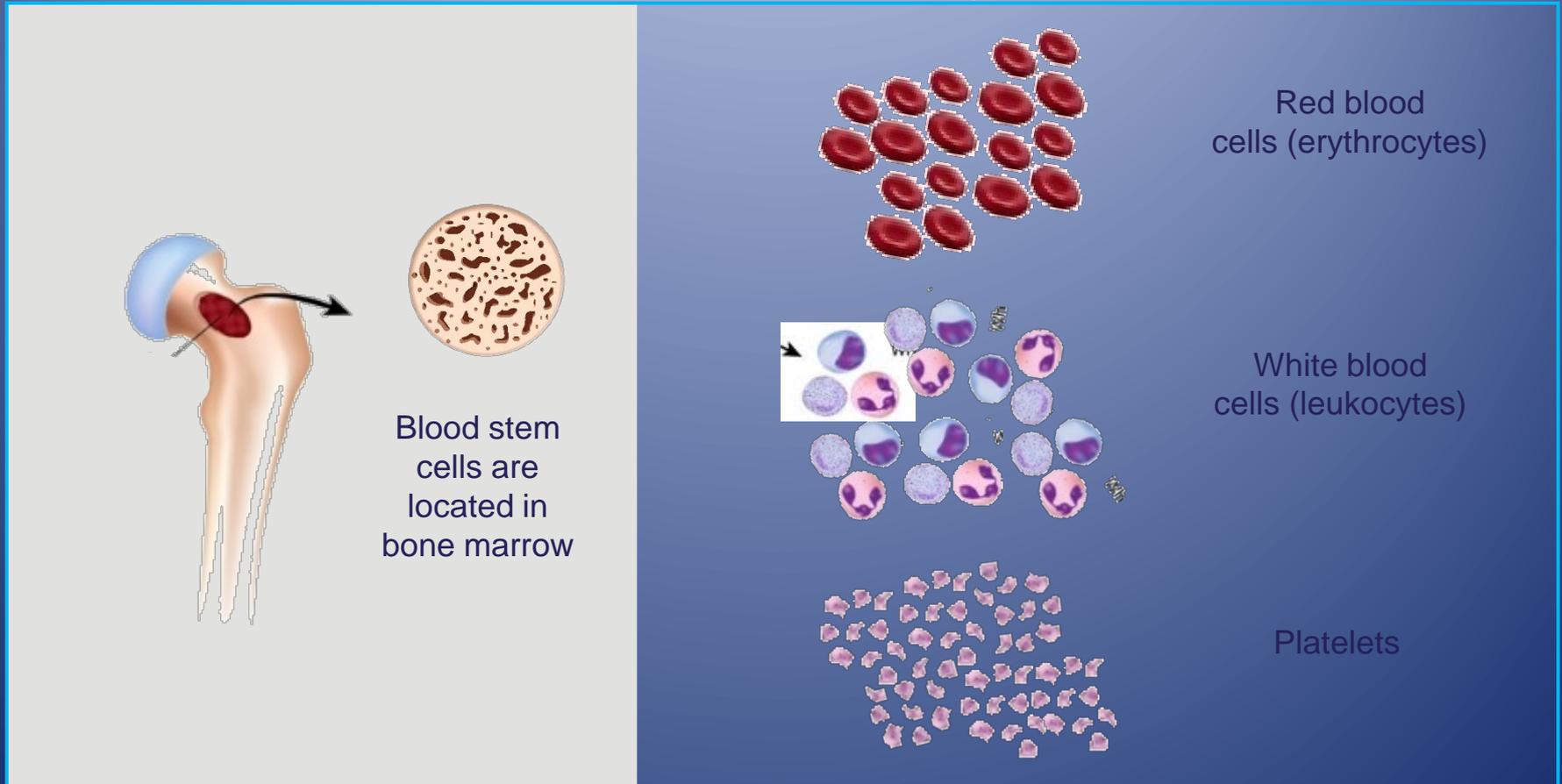


# Blood Cells Develop in the Bone Marrow



*The cells created by your bone marrow need to be replaced every few days, weeks, or months*

# In MPNs, Blood Stem Cells Function Abnormally



*Changes to blood stem cells lead to:*

- › *Overproduction of one or more blood cell types*
- › *Improper overall balance in production of blood cell types*

# Genetic Mutations Associated With MPNs

- ▶ Genetic mutations associated with MPNs affect the way cells communicate, also known as cell signaling
- ▶ Genetic mutations cause the JAK pathway to become overactive leading to
  - ▶ Overproduction of blood cells
  - ▶ Disease related signs
- ▶ All people with MPNs have an overactive JAK pathway
- ▶ Mutated genes include:
  - ▶ *JAK2* (janus kinase 2)
  - ▶ *MPL* (thrombopoietin receptor)
  - ▶ *CALR* (calreticulin)



# Key Molecular Mutations in MPN

Molecular abnormality/ Chromosome location	Frequency	Clinical Significance
<b>JAK2 (Janus kinase 2)</b> <b>9p24</b>	PV 96% ET 55% PMF 65%	Most common molecular mutation in MF Contributes to abnormal myeloproliferation and progenitor cell growth factor hypersensitivity
<b>CALR (Calreticulin)</b> <b>19p13.2</b>	PMF 25% ET 20% PV 0%	Second most common mutation in MF Patients who are CALR+ with ET have a reduced risk of thrombosis Mutation carries more favorable survival
<b>MPL (Myeloproliferative leukemia virus oncogene)</b> <b>1p34</b>	ET 3% PMF 10%	Contributes to primarily megakaryocytic myeloproliferation

**Nonmutated JAK2, MPL, and CALR (Triple Negative) – implies very poor prognosis**

ET, essential thrombocytopenia; PMF, primary myelofibrosis; PV, polycythemia vera.

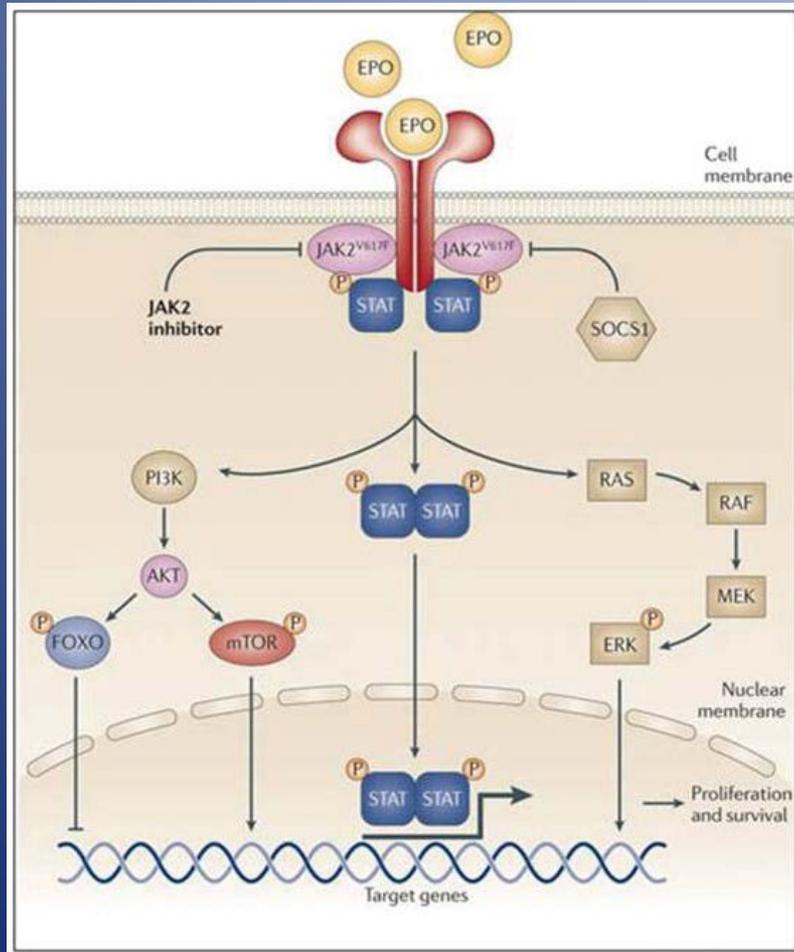
Cazzola M, et al. *Blood*. 2014;123(24):3714-3719.

Tefferi A. *Am J Hematol*. 2014;89(9):915-925.

# Janus Kinases

- When dysregulated, the JAK signaling pathways can lead to ineffective hematopoiesis and increased inflammatory cytokines
- In 2005, the JAK2 V617F mutation was identified as the most common molecular abnormality in myeloproliferative neoplasms
- Other mutations that activate the JAK pathway have been identified
- Thus, dysregulation of the JAK signaling pathway is frequently noted in patients who have myelofibrosis, with or without the V617F mutation

# The JAK-STAT Pathway

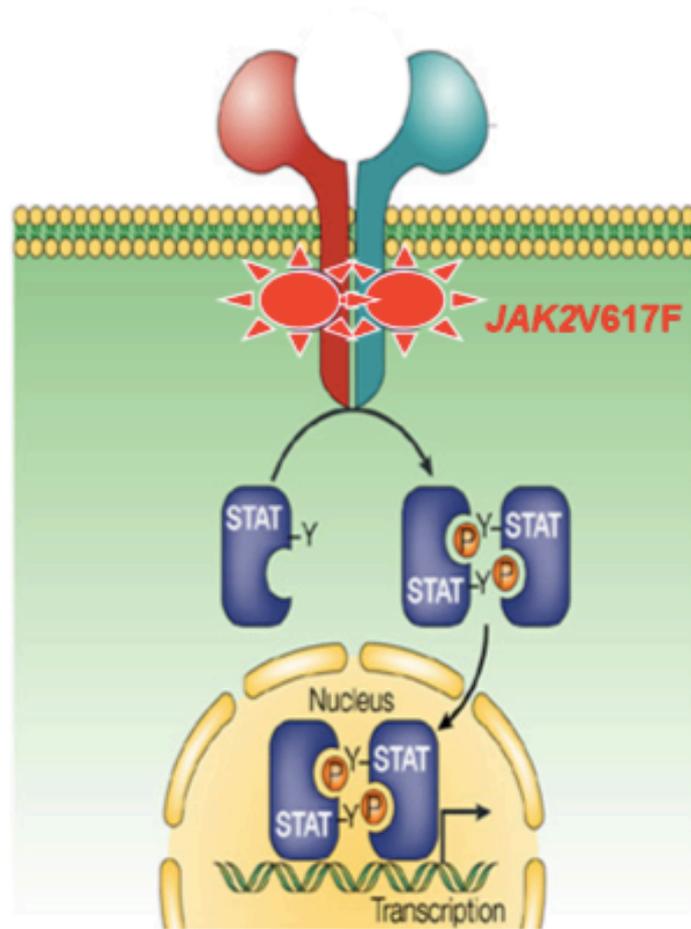


- Intracellular signaling pathway
- Transduction of extracellular signals to the nucleus to control gene expression
- Necessary for growth and differentiation:
  - normal hematopoiesis, fertility, lactation, growth and embryogenesis
- Involved in inflammatory cytokine signaling and immune-regulation
- **Janus Kinases (JAKs)**
  - a family of four cytoplasmic tyrosine kinases:
    - **JAK1, JAK2, JAK3, and TYK2**

\*Janus associated kinase-signal transducer and activator of transcription pathway

# JAK-STAT Pathway Dysregulation

- The *JAK2V617F* mutation is a possible contributor to overactive JAK pathway signaling and is present in >95% of patients with PV and 50%-60% of patients with MF<sup>1,2</sup>
- *JAK2V617F* is not the only mutation<sup>1</sup>



JAK, Janus-associated kinase; PV, polycythemia vera; STAT, signal transducer and activator of transcription.

References: 1. Vannucchi AM, et al. *CA Cancer J Clin.* 2009;59:171-191. 2. Vainchenker W, et al. *Blood.* 2011;118:1723-1735.

# Common Symptoms in MPNs

PV

ET

MF

Fatigue	Filling up quickly (early satiety)	Easily bleeding/bruising
Problems concentrating	Numbness/tingling in hands/feet	Abdominal discomfort
Dizziness/vertigo/lightheadedness	Night sweats	Itching (pruritus)
Difficulty sleeping	Vision changes	Shortness of breath
Fever	Headaches	Bone/Joint pain

*Symptom—something a patient may observe and is often a characteristic of your specific condition*

# Management Depends on Type and Status of Your MPNs

**Watchful waiting—  
Closely monitor without  
therapy unless signs or  
symptoms change**

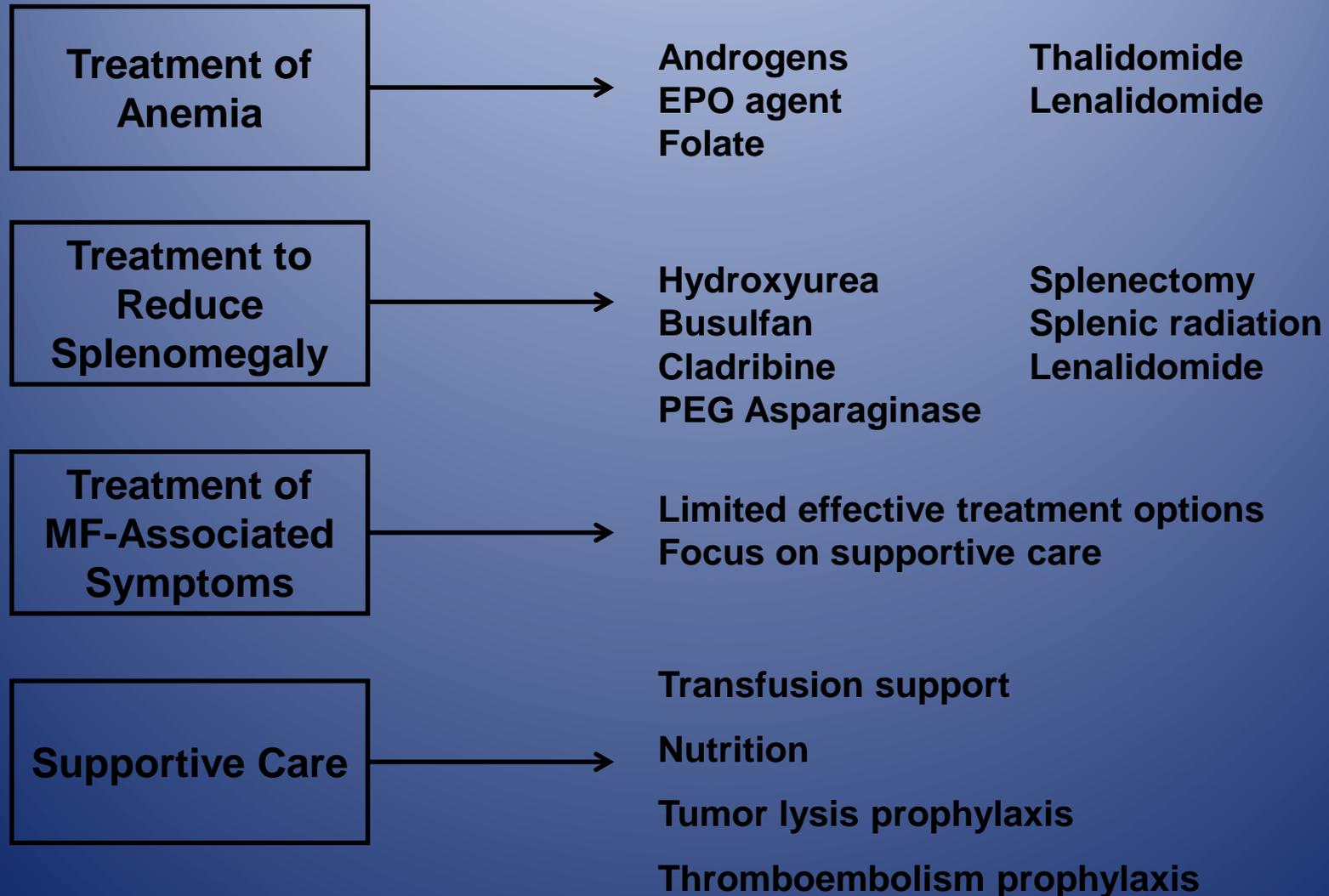
## **Therapies aim to reduce signs/ symptoms and risk of complications**

- ▶ Stimulate or suppress production of certain blood cell types
- ▶ Reduce risk of clotting (thrombosis) in ET and PV
- ▶ Reduce disease-related symptoms
- ▶ Reduce pain associated with splenomegaly and bone pain
- ▶ Reduce the risk of bleeding/ number of bleeding episodes

## **Some Types of Therapies Used**

- ▶ Transfusion therapy
- ▶ Platelet apheresis
- ▶ Phlebotomy
- ▶ Surgery
- ▶ Radiation
- ▶ Stem cell transplant
- ▶ Drug therapies
  - ▶ Chemotherapy
  - ▶ Biologic therapy
  - ▶ Targeted therapy
  - ▶ Other drug therapies, including low-dose aspirin

# Treatment Strategies Prior to JAK Inhibitors: Reduction of Symptom Burden



# PEG Interferon or Alpha Interferon

- Not an FDA approved treatment in MPN
- Weekly injections
- Data supports spleen reduction and improvement of bone marrow fibrosis



# JAK2 Inhibitors

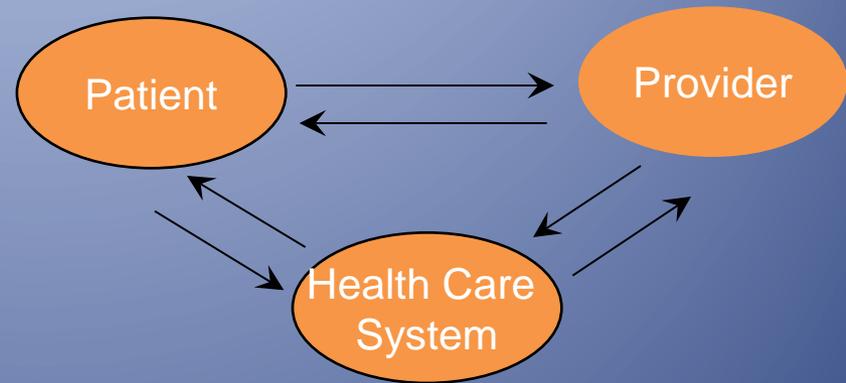
- One of the most important developments in MPNs in recent years
- The first-in-class JAK1/2 inhibitor, ruxolitinib, was approved in 2011 for patients with MF and now approved for HYDREA resistance or intolerance PV patients
- Other JAK inhibitors are at various stages of clinical development
- Symptom Management

# “Drugs don’t work in patients who don’t take them.”

~ C. Everett Koop, MD

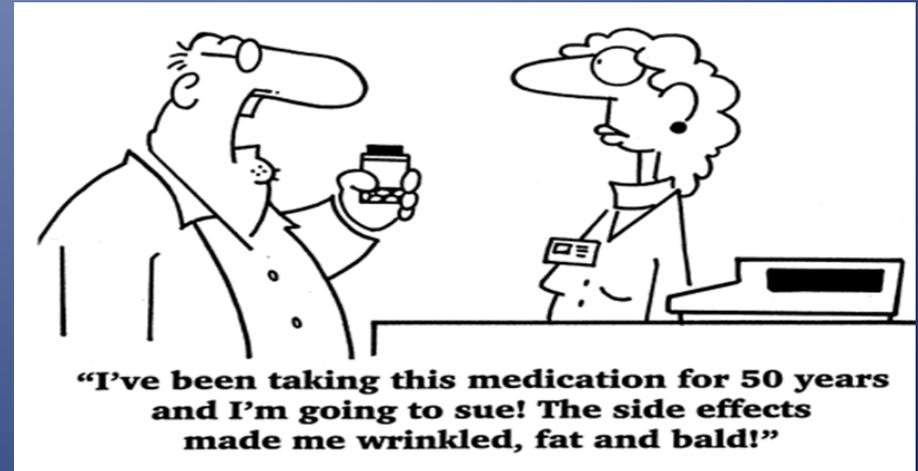
To be adherent, the patient must:

1. Fill the prescription
2. Consume it in a manner consistent with the prescription
3. Continue to take it unless directed otherwise by the HCP
4. Keep follow-up appointments



Nonadherence is:

1. A multifaceted process
2. Linked to both intentional and unintentional factors
3. Not linked to any one type of disease
4. There is no typical patient profile for adherence



# Allogeneic Stem Cell Transplantation

- Allogeneic stem cell transplant (allo-SCT) remains the only potential cure for MF
- Very few patients with MF meet the stringent allo-SCT transplant eligibility criteria
  - Age (median age at diagnosis for MF is 67 years)
  - Comorbidity index
  - Performance status
  - Massive splenomegaly
  - Unexpected rapid progression of disease
- Adequate leukemic clearance prior to allo-SCT offers an optimal outcome
- The prognosis of MPN-blast phase is poor, with reported median survivals of 2-5 months
- High rates of treatment-related mortality have been reported in trials for patients undergoing allo-SCT for MF

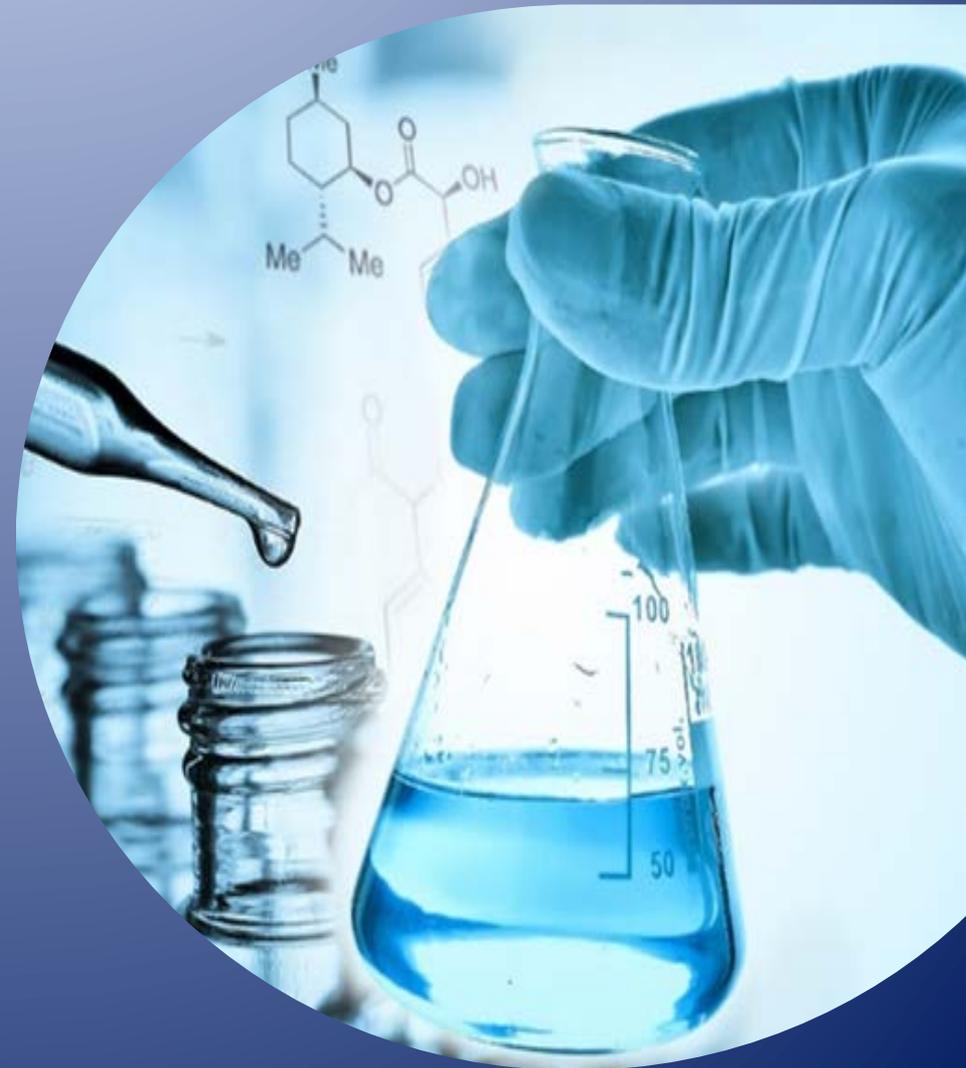
# Clinical Trials

## Goal of clinical trials

- ▶ Advance research and understanding of MPNs
- ▶ Obtain FDA approval for new therapies

## Research areas for future therapies

- ▶ Combination therapies
- ▶ New approaches to classification, diagnosis, and therapy
- ▶ Regulation of gene expression



# Clinical trials: [Clinicaltrials.gov](https://clinicaltrials.gov) or [MPNfoundation.org](https://mpnfoundation.org)

Clinical Trials are very important to find new treatments in MPN's

Navitoclax and Ruxolitinib

Pacritinib

Luspatercept

Ruxolitinib and Thalidomid

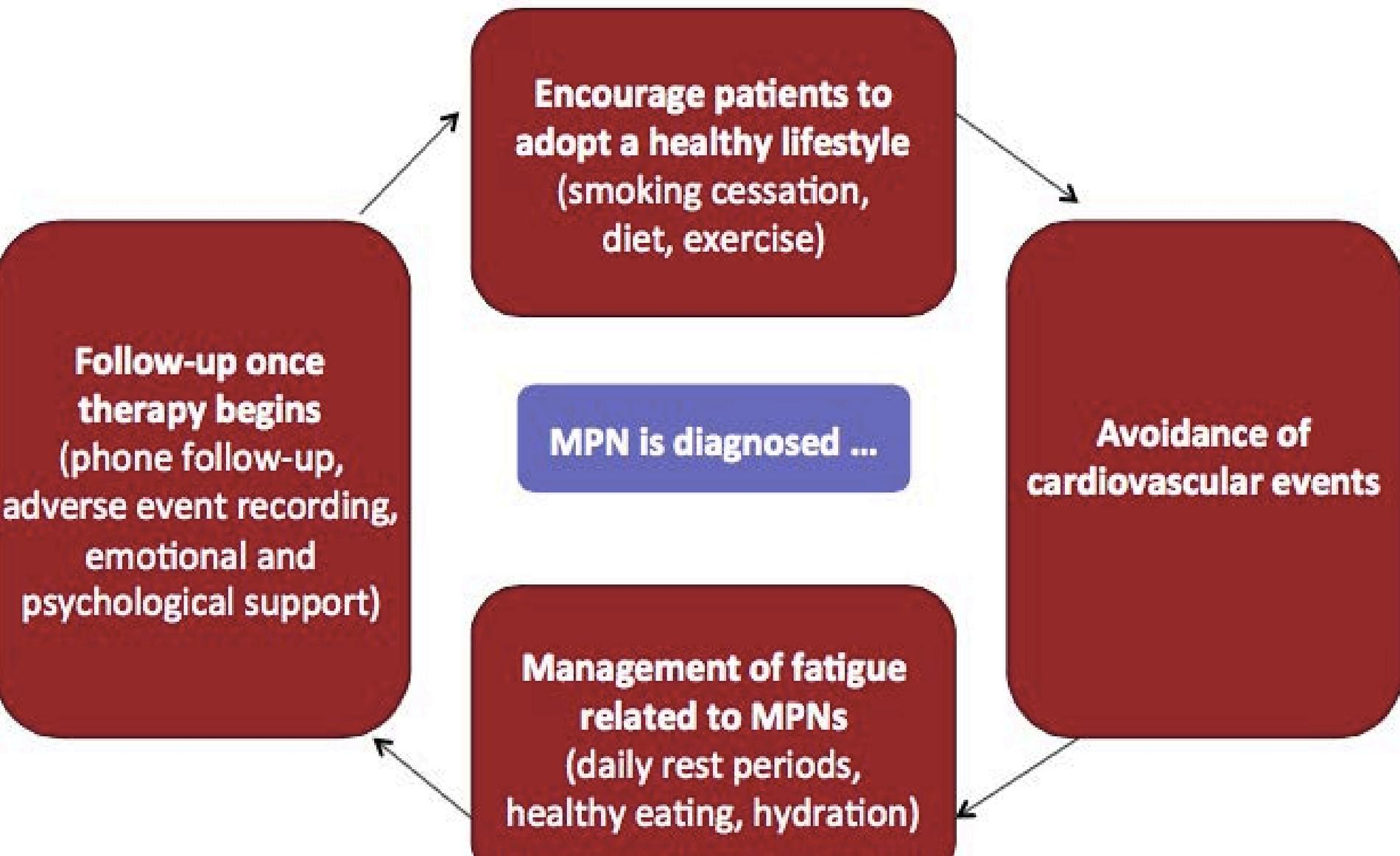
TGR+Ruxolitinib

Nivolumab

PD-1 Inhibition

PRM 151

# The Nurse Role in the Aftermath of an MPN Diagnosis



# Landmark Health Survey— Impact of MPNs on Patients' Lives

2014 MPN Landmark Health Survey conducted  
by expert panel found that:

Most patients  
reported feeling  
anxious or worried  
about their MPN:

91%  
MF

78%  
PV

74%  
ET

Interference with  
family or social life  
reported by  
patients:

79%  
MF

63%  
PV

55%  
ET

Patients reported  
cancelling planned  
activities 1-3 days  
over a 30 day  
period:

21%  
MF

18%  
PV

18%  
ET

# The MPN QOL International Study Group (MPN-QOL-ISG)

<b>Sexuality</b>	<ul style="list-style-type: none"><li>- Age, language, diminished role functioning, insomnia, depression/sad mood, night sweats, and QOL have been correlated with challenges with intimacy and sexuality</li></ul>
<b>Insomnia</b>	<ul style="list-style-type: none"><li>- Insomnia is highly prevalent and severe in MPN patients</li><li>- Correlates with most other MPN-related symptoms</li><li>- Headaches, extremity tingling, depression, sexual problems, night sweats, pruritus, fever, and QOL have been correlated with insomnia</li></ul>
<b>Pruritus</b>	<ul style="list-style-type: none"><li>- Pruritus is common and disabling in patients with MPNs</li><li>- The most effective strategies for management observed in 88 patients with MF (N = 566) reporting pruritus: JAK inhibitors (92%), thalidomide (83%), or pain relievers (83%); hydroxyzine (43%), antihistamine (37%), and antidepressants (32%)</li><li>- The average time to pruritus alleviation in the entire cohort was 2 months (range, 1 day to 25 months)</li></ul>

# Speaking to your Health Care Team

- Understand your disease
- Know some ways to manage your condition
- Educate and remain knowledgeable about MPN's
- Have regular discussions with your health care team
- Know the goals of management
- Know the importance of your bloodwork
- Keep a journal of your symptoms

# Fatigue

- One of the most difficult side effects to treat
  - Blood is not always the answer
  - Encouraging light exercise – i.e. walking!
  - Listening to your body



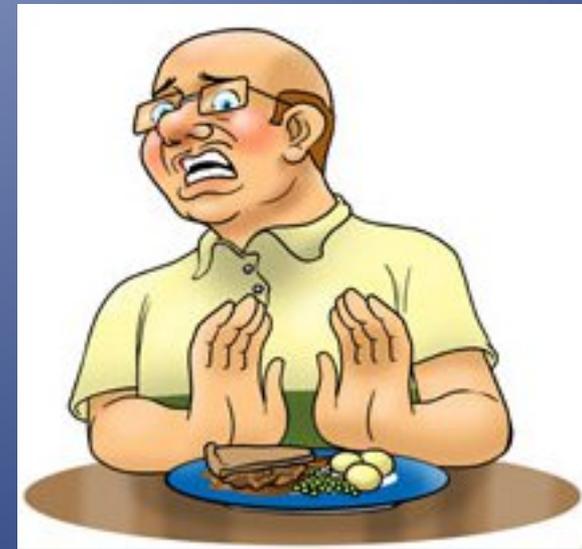
# Gastrointestinal Toxicity

- Nausea: Identify and treat EARLY!
  - Side effect of specific treatments
  - Choosing an anti-emetic (NP)
- Constipation: Identify and treat EARLY!
  - Side effect of specific treatments
  - Prevention vs. Treatment
- Diarrhea: Identify and treat EARLY!
  - Side effect of specific treatments
  - Electrolyte imbalances
  - Test for infectious process before treating



# Poor Appetite

- Weight loss is common with MPN's
  - Identify if it is poor appetite or nausea
  - High calorie foods
  - High protein foods
  - Maximizing every bite
  - Grazing
  - Nutrition consult
  - Medical Marijuana
  - Mirtazapine



# Monitor Your MPN With a Symptom Tracker

## 10 MPN symptoms to watch for

- ▶ Fatigue (tiredness)
- ▶ Filling up quickly when you eat (early satiety)
- ▶ Abdominal discomfort
- ▶ Inactivity
- ▶ Problems with concentration
- ▶ Night sweats
- ▶ Itching
- ▶ Bone pain
- ▶ Fever
- ▶ Recent, unintentional weight loss

### Myeloproliferative Neoplasm Symptom Assessment Form Total Symptom Score (MPN-SAF TSS)

Symptom	1 to 10 (0 if absent) ranking 1 is most favorable and 10 least favorable
Please rate your fatigue (weariness, tiredness) by circling the one number that best describes your WORST level of fatigue during past 24 hours*	(No Fatigue) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)

Circle the one number that describes how, during the past week how much difficulty you have had with each of the following symptoms	
Filling up quickly when you eat (Early satiety)	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Abdominal discomfort	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Inactivity	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Problems with concentration – Compared to prior to my MPD	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Numbness/Tingling (in my hands and feet)	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Night sweats	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Itching (pruritus)	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Bone pain (diffuse not joint pain or arthritis)	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)
Fever (>100 F)	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Daily)
Unintentional weight loss last 6 months	(Absent) 0 1 2 3 4 5 6 7 8 9 10 (Worst Imaginable)

\* Question used with permission from the MD Anderson Cancer Center Brief Fatigue Inventory ©

You can download additional copies of the  
MPN10 Symptom Assessment Form online at  
[www.mylifewithmf.com/mpn-symptom-form.pdf](http://www.mylifewithmf.com/mpn-symptom-form.pdf)

# Share what's on your mind

- Maintain relationships with loved ones and healthcare team
- Stay involved in your healthcare plan
- Always reevaluate how you feel
- Ask questions about things you have on your mind
- Find support in your community or online



# Find the Healthcare Team That is Right for You

## Recommendations from the American Cancer Society— Questions to ask yourself after meeting with a healthcare professional

- ▶ How comfortable did you feel talking with them?
- ▶ Did they give you a chance to ask questions?
- ▶ Did they seem comfortable answering your questions?
- ▶ Did they talk to you in a way that you could understand?
- ▶ Do you feel they listened to you and respected you?
- ▶ Did they talk about short-term and long-term management goals?
- ▶ Do you feel they spent enough time with you?



# Biopsychosocial Approach To Care

- Psychological:
  - Act as a confidant for patients and liaison to multi-disciplinary team
  - Emotional support for patients and their caregivers
  - Identifying stressors and assisting with management
  - Mental health referrals
  - Addressing and collaboration to increase adherence to medications (including oral chemotherapy drugs as well as supportive medications)

# Biopsychosocial Approach To Care

- Social:
  - Loss of job, autonomy, daily routine
  - Change of role in family unit and in other arenas
  - Appropriate referrals to organizations for support
  - Referral to social work



# Remain Involved in and Understand Your Management Plan

- ▶ Prepare for office visits
- ▶ Track your care
- ▶ Keep your healthcare team updated

Discuss with your healthcare team

- ▶ Know your management goals
- ▶ Know your blood count targets
- ▶ Know your management plan
- ▶ Know how often to schedule office visits and tests
- ▶ Know what symptoms and problems to watch for

**Partner with Your Healthcare Team**

**Understand Your Management Plan**

# Enjoy each day

- Write a list of things that make you happy
- Listen to music, go for walks, sit in the park, play with pets and spend time with family
- Continue doing your favorite activities
- Set dates and have goals to look forward to

# Eat right

- Avoid processed foods
- Eat fresh fruits and vegetables
- Limit red meat
- Eat a colorful meal
- Eat more frequent small meals or healthy snacks
- Avoid soda and make sure you hydrate enough each day

# Physical Activity

- Remaining active helps with fatigue
- People who remain active do better
- Do activities in the morning before get too fatigued
- Yoga and meditation for stress reduction
- Join a gym or workout group

# Learn About Ways to Support Yourself

## Non-Profit (501c3) Websites—approved by the IRS as tax-exempt, charitable organizations

- ▶ MPN Research Foundation
- ▶ MPN Education Foundation
- ▶ MPN Coalition
  - ▶ Other groups that support:
    - ▶ Cancer Care
    - ▶ Cancer Support Community
    - ▶ LLS
    - ▶ MPN Education & Advocacy International
    - ▶ NORD

## Organization Websites— information put out by larger clinics/hospitals/ pharmaceutical companies

### Sponsored:

- ▶ MPN Advocacy & Education International
- ▶ Voices of MPN
- ▶ CancerConnect.com
- ▶ Patient Power
- ▶ Medical Community:
  - ▶ Mayo Clinic
  - ▶ WebMD

## Financial Support

- ▶ Patient Access Network Foundation
- ▶ Good Days
- ▶ NORD
- ▶ NeedyMeds

# The Social Worker's Role

- Establish relationship with social worker early on (at diagnosis!)
  - Counseling for patient and support network
  - Access to durable medical equipment to assist with ADLs
  - Referral to appropriate support groups, organizations
  - Financial assistance







# Thank you!!

- QUESTIONS ?????