UNDEARTANDING BONE MARROW AND BLOOD

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Objectives

1. From bone marrow to blood... or from blood to bone marrow
   – what is this all about?

1. MDS – an introduction
   Myelo Where?
   Dysplastic How?
   Syndrome What types?

   and what can we do with it?
“If you can’t explain it to a six year-old, you don’t understand it yourself”

Albert Einstein

Once upon a time ... Life
Blood cells

Platelets (PLT)

Red cells (RBC) = erythrocytes

White (WBC)
- Neutrophils
- Eosinophils
- Basophils
- Monocytes
- Lymphocytes

→ What is their job?
Blood cells

Red cells (RBC)
Red $\rightarrow$ haemoglobin

- **Their job**
  - carrying oxygen around the body $\rightarrow$ “fuel” for the body

- **When they are low**
  = anaemia
  - tiredness
  - shortness of breath
  - dizziness on standing
  - palpitations

- **What can be done about it**
  - transfusions
  - sometimes EPO (erythropoietin) injections
Blood cells

Platelets (PLT)

- **Their job**
  - forming plugs to stop bleeding after injury

- **When they are low**
  - thrombocytopaenia
  - abnormal bruising, bleeding

- **What can be done about it**
  - transfusions
  - sometimes tranexamic acid
Blood cells

**Big family**
- Neutrophils
- Eosinophils
- Basophils
- Monocytes
- Lymphocytes

**White cells (WBC)**

- **Their job**
  - main job = fight infections

- **When they are low**
  - leucopaenia (neutropaenia)
    - infections
    - mouth ulcers

- **What can be done about it**
  - prevention
  - sometimes GCSF injections
Blood cells

- Platelets (PLT)
- Red cells (RBC) = erythrocytes

White (WBC)
- Neutrophils
- Eosinophils
- Basophils
- Monocytes
- Lymphocytes

→ What is their job?
→ Where do they come from?
Bone marrow

Hematopoietic stem cells

Myeloid progenitor cells

Erythrocytes

Lymphoid progenitor cell

Platelets

Eosinophil

Basophil

Neutrophil

Monocyte

T-cell

B-cell

Bone marrow

Blood
MDS

**Myelo**

- Where?
  - Bone marrow
  - → type of bone marrow cancer
  - → bone marrow biopsy required

**Dysplastic**

- How?
  - Based on
    1. what the cells look like in the blood and bone marrow (BM)
    2. the “cytogenetics” (BM)

Myelo + dysplastic → low number of cells in the blood (cytopaenia)

**Syndrome**

- What types?
  - Based on
    1. What the cells look like
    2. Number of immature cells (blasts)
    3. Most affected family (RBC, PLT, WBC)

→ 2016 WHO classification of MDS
<table>
<thead>
<tr>
<th>Name</th>
<th>Dysplastic lineages</th>
<th>Cytopenias*</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDS with single lineage dysplasia (MDS-SLD)</td>
<td>1</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MDS with multilineage dysplasia (MDS-MLD)</td>
<td>2 or 3</td>
<td>1-3</td>
</tr>
<tr>
<td><strong>MDS with ring sideroblasts (MDS-RS)</strong></td>
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<td></td>
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<tr>
<td>MDS-RS with single lineage dysplasia (MDS-RS-SLD)</td>
<td>1</td>
<td>1 or 2</td>
</tr>
<tr>
<td>MDS-RS with multilineage dysplasia (MDS-RS-MLD)</td>
<td>2 or 3</td>
<td>1-3</td>
</tr>
<tr>
<td>MDS with isolated del(5q)</td>
<td>1-3</td>
<td>1-2</td>
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<tr>
<td><strong>MDS with excess blasts (MDS-EB)</strong></td>
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<tr>
<td>MDS-EB-1</td>
<td>0-3</td>
<td>1-3</td>
</tr>
<tr>
<td>MDS-EB-2</td>
<td>0-3</td>
<td>1-3</td>
</tr>
<tr>
<td>MDS, unclassifiable (MDS-U)</td>
<td></td>
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</tbody>
</table>
Prognosis

- different markers of prognosis related to:
  - general fitness, age
  - the MDS itself (blood counts, blasts, cytogenetics)

  $\rightarrow$ IPSS-R score

- Risk = development of acute myeloid leukaemia (AML)
Bone marrow

BLASTS = leukaemic cells
Each patient is unique.

Rare to cure MDS... but usually “controllable”.

4 big categories of medical treatment

- **supportive care**
  - transfusions of RBC and PLT
  - EPO +/- GCSF injections
  - treatment of infections

- **non-intensive chemotherapy**
  - azacitidine

- **intensive chemotherapy**

- **stem cell transplant**

Symptom control
Slow down progression
Only curative treatment
Treatment

You are not your disease.

But will have to learn how to live with it...

Family and friends
Support group
Macmillan team
Cancer support nurse
Clinical nurse specialist
Doctors