



# EBMT Pocket Guide

### Therapeutical management according to the European Consensus Conference\*

**Score 1: Monitoring, No options**

- Extensive and immediate erythema.
- Early Transient Incapacitation Syndrome (temporary loss of consciousness).
- High fever.
- Hypotension.
- Immediate diarrhoea.

### European approach for the medical management of mass radiation exposure

**Score 2: Symptomatic treatment**

- Supportive care: analgesics, antipyretics, antiemetics, fluid resuscitation, etc.
- Antihistamines for allergic reactions.
- Antibiotics for secondary infections.
- Wound care for burns and lacerations.

### The first 48 hours

**Life-threatening wounds and burns should be treated first**

**Urgent sampling**

- Blood cell counts (+ differentials) every 4-8 hours for the 1<sup>st</sup> 24 hours, 12-24 h after.
- Chromosome aberrations on blood lymphocytes (biodosimetry) (15 ml + heparin).
- Red cell group typing.
- Store serum and cells or DNA for further analyses including HLA typing.
- Standard biochemistry + amylasemia.
- Blood (20 ml) to measure <sup>24</sup>Na if exposure to neutrons.
- Urine and faeces if radionuclide contamination is suspected.

## 最初の48時間の留意点

- MOF所見がないか注意する
- 被ばく量推定
- 迅速なサンプリング

### The first 48 hours

**Life-threatening wounds and burns should be treated first**  
 Irradiation is not contamination – An irradiated person is not a source of radiation – In case of additional contamination, decontamination comes first

#### Beware of Multiple Organ Failure (MOF)

The severity of prodromal clinical features is of major importance.

- Extensive and immediate erythema.
- Early Transient Incapacitation Syndrome (temporary loss of consciousness).
- High fever.
- Hypotension.
- Immediate diarrhoea.

#### Physical dosimetry

- Inquiry: circumstances of the accident, source characteristics, source-victim geometry, duration of exposure, daily dose rate, shielding, homogeneous/heterogeneous irradiation.
- Labelling and storage of personal belongings and clothes, biological material (hair, nails).

#### Urgent sampling

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## MOF所見に注意する

- 急性発症の顕著な紅斑
- 意識障害
- 高熱
- 血圧低下
- 急性発症の下痢

### Beware of Multiple Organ Failure (MOF)

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- Extensive and immediate erythema.
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## 被ばく量推定

- **問診**
  - 被ばく状況、被ばく源
  - 被ばく源の性質
  - 被害者の位置関係
  - 被ばく期間
  - 一日被ばく線量
  - 遮蔽の有無
- 患者の所有物、爪、毛髪の保存

### Physical dosimetry

- Inquiry: circumstances of the accident, source characteristics, source-victim geometry, duration of exposure, daily dose rate, shielding, homogeneous/heterogeneous irradiation.
- Labelling and storage of personal belongings and clothes, biological material (hair, nails).



## 迅速なサンプリング (EBMT)

### Urgent sampling

- Blood cell counts (+ differentials) every 4-8 hours for the 1<sup>st</sup> 24 hours, 12-24 h after.
- Chromosome aberrations on blood lymphocytes (biodosimetry) (15 ml + heparin).
- Red cell group typing.
- Store serum and cells or DNA for further analyses including HLA typing.
- Standard biochemistry + amylasemia.
- Blood (20 ml) to measure <sup>24</sup>Na if exposure to neutrons.
- Urine and faeces if radionuclide contamination is suspected.

- 血算(分画)
  - 最初24時間は4-8時間毎、以降12-24時間毎
- 血液リンパ球の染色体異常(生物学的線量測定)
- 血液型
- 血清、細胞、DNA保存,HLA typing.
- アミラーゼを含む生化学検査
- 中性子被ばくの際は<sup>24</sup>Na
- 内部被ばくが疑われる場合は、尿・便を保存する



## 初期重症度決定資料



# リンパ球数と重症度(EBMT)

**Primary scoring**  
*Record all clinical symptoms on a date and hour-stamped chart*

Score I
Score II
Score III

**Depletion of blood lymphocytes**

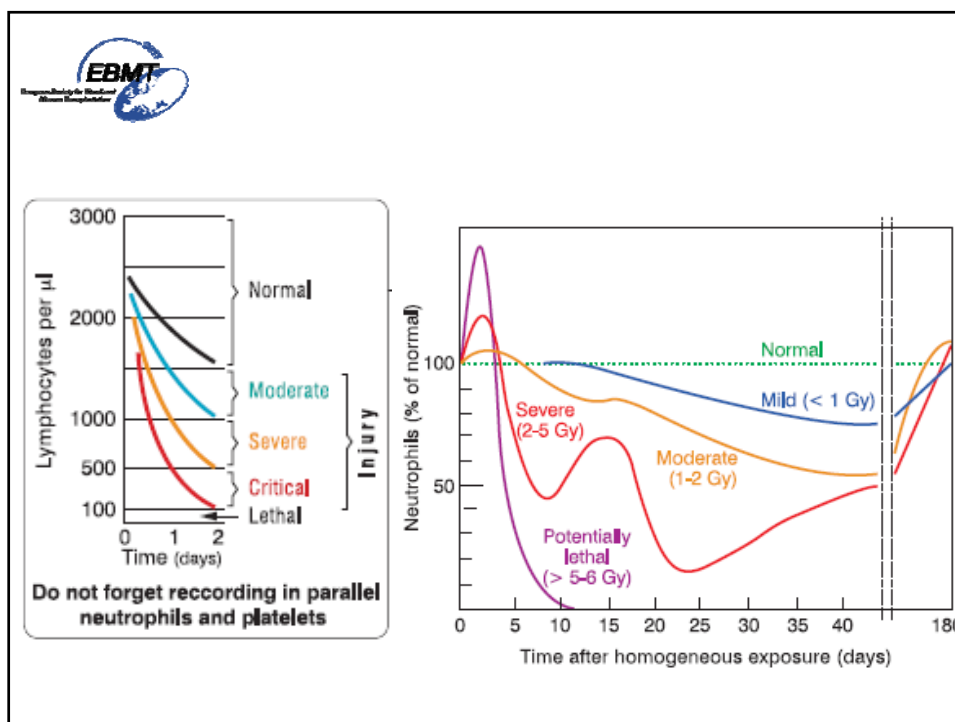
	Above 1 500 / $\mu$ l	Below 1 500 / $\mu$ l	Below 500 / $\mu$ l
At 24 hours	Above 1 500 / $\mu$ l	Below 1 500 / $\mu$ l	Below 100 / $\mu$ l
At 48 hours	Above 1 500 / $\mu$ l	Below 1 500 / $\mu$ l	Below 100 / $\mu$ l

Outpatient monitoring

Hospitalisation for curative treatment

Hospitalisation (MOF predicted)

**Warning: the symptoms and values indicated above are reliable only in case the whole body or large parts of the body have been externally exposed to a high radiation dose delivered within few minutes or few hours.**  
 Fill and fax MED A (radiation accident) to : (+33)1 40 46 96 07



Primary scoring	
Record all clinical symptoms on a date and hour-stamped chart	
	<b>Score I</b>
Average delay before symptoms appear	Less than 12 hours
Cutaneous erythema	0
Asthenia	+
Nausea	+
Vomiting per 24 hrs	Maximum 1
Diarrhea / Number of stools per 24 hrs	Maximum 2 - 3; bulky
Abdominal pain	Minimal
Headaches	0
Temperature	Below 38°C
Blood pressure	Normal
Temporary loss of consciousness	0
	<b>Score II</b>
	Less than 5 hours
	+/-
	++
	+++
	1 to 10
	2 - 9; soft
	intense
	++
	38 - 40°C
	Normal - Possible temporary decrease
	0
	<b>Score III</b>
	Less than 30 minutes
	+++; before 3 <sup>rd</sup> hour
	+++
	(-)
	Above 10; intractable
	Above 10; watery
	Excruciating
	Excruciating; Signs of intra-cranial HT
	Above 40°C
	Systolic below 80
	+ / Coma

## 重症度決定資料(EBMT)

	Primary scoring		
	Score1	Score2	Score3
症状が出るまでの平均的時間	12時間以内	5時間以内	30分以内
紅斑		0+/-	+++
衰弱	+	++	3時間以内+++
嘔気	+	+++	(-)
一日の嘔吐回数	最大で1回	1 to 10	10回以上頑固
一日の下痢回数	最大2 - 3; 形あり	2 - 9; 軟便	10回以上; 水様
腹痛	軽度	強度	激痛
頭痛		0++	激痛; 脳圧亢進
体温	38°C未満	38 - 40°C	40°C以上
血圧	正常	正常または一過性低下	80未満
一過性意識消失		0	0+ / Coma
Depletion of blood lymphocytes	24h Above 1 500 / $\mu$ l	Below 1 500 / $\mu$ l	Below 500 / $\mu$ l
	48h Above 1 500 / $\mu$ l	Below 1 500 / $\mu$ l	Below 100 / $\mu$ l
注意: 本表は全身が被ばくした場合に 使用	Outpatient	monitoring Hospitalisation for curative treatment	Hospitalisation (MOF predicted)

## 48時間以降

Beyond the first 48 hrs, a second patient scoring is done by organs (Neurovascular, Hemopoiesis, Cutaneous, Gut) according to the METREPOL document\*\* for therapeutical management and Multiple Organ Failure (MOF) prediction.

- 48時間以降は、2回目のScoringをMETREPOLの神経、血液、皮膚、消化管の臓器評価に従って行い、治療とMOF予測を行う。

### Score I: Monitoring. No cytokine

- Outpatient clinical monitoring.
- Blood count: - every day for 6 days,  
- then once a week for 2 months.

- 外来フォロー
- 最初の6日は毎日血算を行う
- その後は毎月1回で6週まで

### Score II: Cytokines (curative)

- G-CSF+ KGF should be used as early as possible for 14-21 days. TPO and agonists, EPO and stem cell factor questionable.
- Symptomatic treatment of gastrointestinal damage.
- If severe aplasia → Protected environment.
- Accidental radiation exposure is generally heterogeneous. Some under-exposed/protected regions of bone marrow can give rise to endogenous hematopoietic recovery.

- G-CSF+KGFを14-21日可及的速やかに使用
- TPO,EPO,SCFについてのエヴィデンスは不明
- 胃腸障害の治療
- 骨髄不全であれば防護環境(無菌治療室)
- 放射線事故による被ばくは一般にheterogeneous
- 被ばくされていない骨髄からの自力回復が可能

### Score III: Cytokines (until reappraisal of score)

- Palliative/Symptomatic treatment.
- Re-evaluation during the first week based on laboratory or clinical symptoms revealing irreversible organ damage or multi organ dysfunction.

- 緩和的治療、対症療法
- 最初の1週で検査結果、臨床症状で再評価を行い、回復不可能な臓器障害、多臓器不全かどうかを明らかにする

All blood products should be irradiated

Severe radiological skin lesions have a peculiar torpid evolution and require specialist treatment.

- すべての血液製剤は照射すること
- 重症の皮膚障害は進行が遅く、専門医による治療を必要とする

## Hematopoietic stem cell (HSC) transplantation

### 造血幹細胞移植



## Hematopoietic stem cell (HSC) transplantation

### Background

- HSC transplantation is not an emergency.
- It is crucial to avoid GVHD in order not to compromise an endogenous recovery.
- If severe aplasia persists under cytokines for more than 14 days, the possibility of an hematopoietic stem cell (HSC) transplantation is discussed.

### Criteria to transplant

- Severe marrow aplasia persisting 14 - 21 days.
- No residual hematopoiesis.
- No irreversible organ damage (GI tract, lungs...).

## 背景・適応

- 造血幹細胞移植は緊急に行うものでない
- 自己造血の回復を複雑にするGVHDを避けることが重要である
- 14日間以上のG-CSF投与しても重症の造血不全が続く場合に、造血幹細胞移植の適応について考える
- 自己造血の回復の見込みがないこと
- 不可逆的な臓器不全がないこと

## Graft

- **Type of graft:**
  - Bone marrow.
  - Peripheral blood HSC (depleted or not).
  - Cord blood.
- **Donor in the following order of priority:**
  - HLA-identical sibling or 7/8 matched.
  - HLA-identical unrelated donor or 9/10 matched.
  - Cord blood > 4/6 matched.
- **Doses of cells to be grafted:**

At least:

  - $2 \times 10^6$  CD34 cells.kg<sup>-1</sup> (peripheral blood);
  - $2 \times 10^8$  nucleated cells.kg<sup>-1</sup> (bone marrow);
  - $3 \times 10^7$  nucleated cells (cord blood).

## Conditioning and GVHD prevention

- **Non myelotoxic conditioning:**
  - Fludarabine (30 mg.m<sup>-2</sup>.d<sup>-1</sup> for 3 days) ± anti-lymphocyte globulins.
- **GVHD prevention:**
  - No Methotrexate.

- ドナー選択、HLA適合度、輸注細胞数については通常の移植と同じ
- 減量レジメンを使用する
- GVHD予防にMTXを使用しない