Introduction to Chemotherapy

Determing factors in cancer

- **Disease**
- Hematologic vs. Solid tumors
- Acute vs Chronic

- **Patient**
- Age, comorbidities, psycological, social and economic status

- **Treatment**

Type of treatment for malignancy

Systemic therapy

- Chemotherapy
- Hormone therapy
- Monoclonal Ab
- Immune therapy
- TKI

Local therapy

- Surgery
- Raditherapy

How to decrease complication of treatment

- Hx & P/E before treatment
- Mandatory Lab exam
- Evaluation of kidney, liver and cardiovascular
- Acceptable port for systemic therapy
- Expert oncologic nurses
- Suitable physical clinic for chemotherapy
- Training the patient

performance status

- Quantify cancer patients general well-being and activities of daily life.

ECOG	Description
0	Fully active, able to carry on all pre-disease performance without restriction.
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work.
2	Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours.
3	Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours.
4	Completely disabled. Cannot carry on selfcare. Totally confined to bed or chair
5	Dead

Karnofsky scoring

Normal; no complaints; no evidence of disease	100%
Able to carry on normal activity; minor signs or symptoms of disease	90%
Normal activity with effort; some signs or symptoms of disease	80%
Cares for self; unable to carry on normal activity or do work	70%
Requires occasional assistance but is able to care for most personal needs	60%
Requires considerable assistance and frequent medical care	50%
Disabled; requires special care and assistance	40%
Severely disabled; hospitalisation indicated although death not imminent	30%
Very sick; hospitalisation necessary; requires active support treatment	20%
Moribund; fatal processes progressing rapidly	10%
Dead	0%

Laboratory test before chemotherapy

- CBC

WBC		13.70	(4	- 11	)	10e3/µL
RBC		3.82	(4.2	- 6.2	)	10e6/µL
HGB		11.9	(12	- 18	)	g/dL
HCT		35.9	(37	- 52	)	%
MCV	93.9		(80	- 100	)	fL
MCH	31.2		(26.4	- 32	)	pg
MCHC	33.3		(31	- 36	)	g/dL
RDW		16.1	(11.5	- 16	)	%
HDW	2.33		(2.2	- 3.2	)	g/dL
PLT	201		(130	- 400	)	10e3/µL
MPV	9.4		(6.1	- 11.1	)	fL
PDW	50.2		(25	- 65	)	%
PCT	0.19		(0.10	- 0.40	)	%
%NEUT	44.4		(40	- 74	)	%
%LYMPH	45.7		(19	- 48	)	%
%MONO	5.9		(3.4	- 9	)	%
%EOS	0.9		(0	- 4	)	%
%BASO	0.6		(0	- 1.5	)	%
%LUC	2.5		(0	- 4	)	%
%NRBC	0		(0.0	- 2.0	)	NRBC/100
MPXI	-2.7		(-10	- 10	)	

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	CBC		
H	49.99	x10³/µL	WBC
L	2.33	x10⁶/µL	RBC
L	6.6*	g/dL	HGB
L	21.0	%	HCT
	90.3	fL	MCV
	28.2*	pg	MCH
L	31.2*	g/dL	MCHC
H	17.8	%	RDW
H	3.82	g/dL	HDW
L	23*	x10³/µL	PLT
	5.8*	fL	MPV
	76.5*	%	PDW
L	.02*	%	PCT
RBC FLAGS			1416

%	DIFF		x10³/µL
L 13.0	NEUT		6.49
24.5	LYMP	H	12.24
7.9	MONO	H	3.97
1.7	EOS	H	.87
H 1.7	BASO	H	.83
H 51.2	LUC	H	25.59
LI		L	1.33*
MPXI		H	10.8
WBC FLAGS			3201

MORPHOLOGY FLAGS

PARAMETER	SUSP	VERIFY
ANISO	+	
MICRO	+	
MACRO	+	
VAR	+	
HYPO	++	
HYPER		
L SHIFT		
ATYP	+	
BLASTS	+	
OTHER		
OTHER	PLT	

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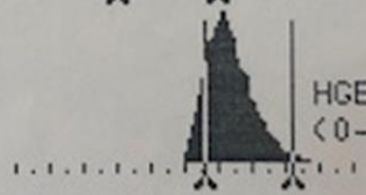
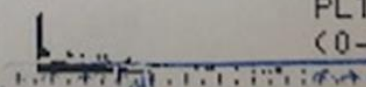
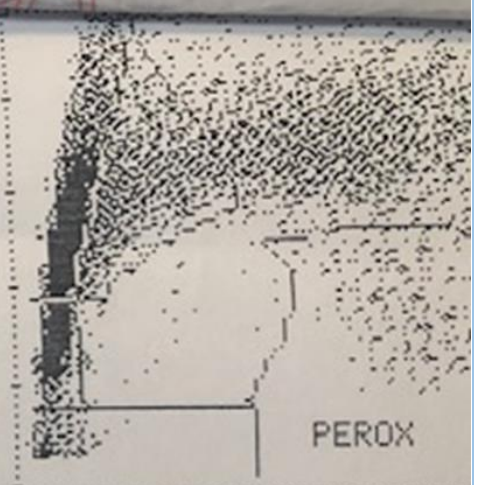
RBC VOLUME
(0-200 fL)

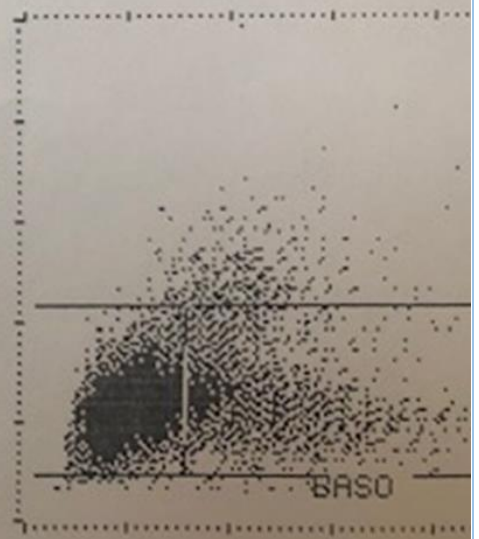


HGB CONC
(0-50 g/dL)



PLT VOLUME
(0-20 fL)





Indication of transfusion for chemotherapy

- Packed cells
- Platlets
- FFP

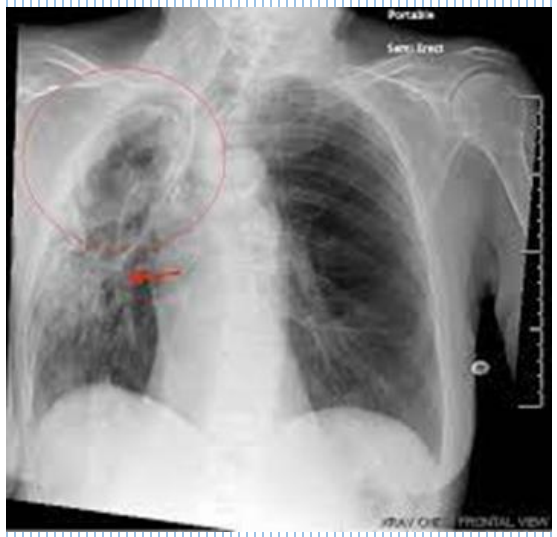
Approach to infecton in cancerous patient

Neutropenic fever

Evaluation

Indication of treatment

- Antibiotics
- Antifungal
- antiviral



Prophylxis

Colony Stimulating Factors

GCSF

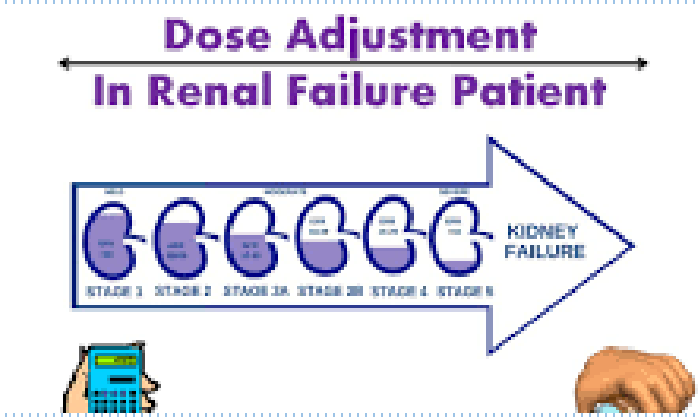
- Short acting
- Long acting

Erythropoetin

TPO

Renal Assessment

- BUN, Cr
- Renal adjustment: cisplatin, MTX



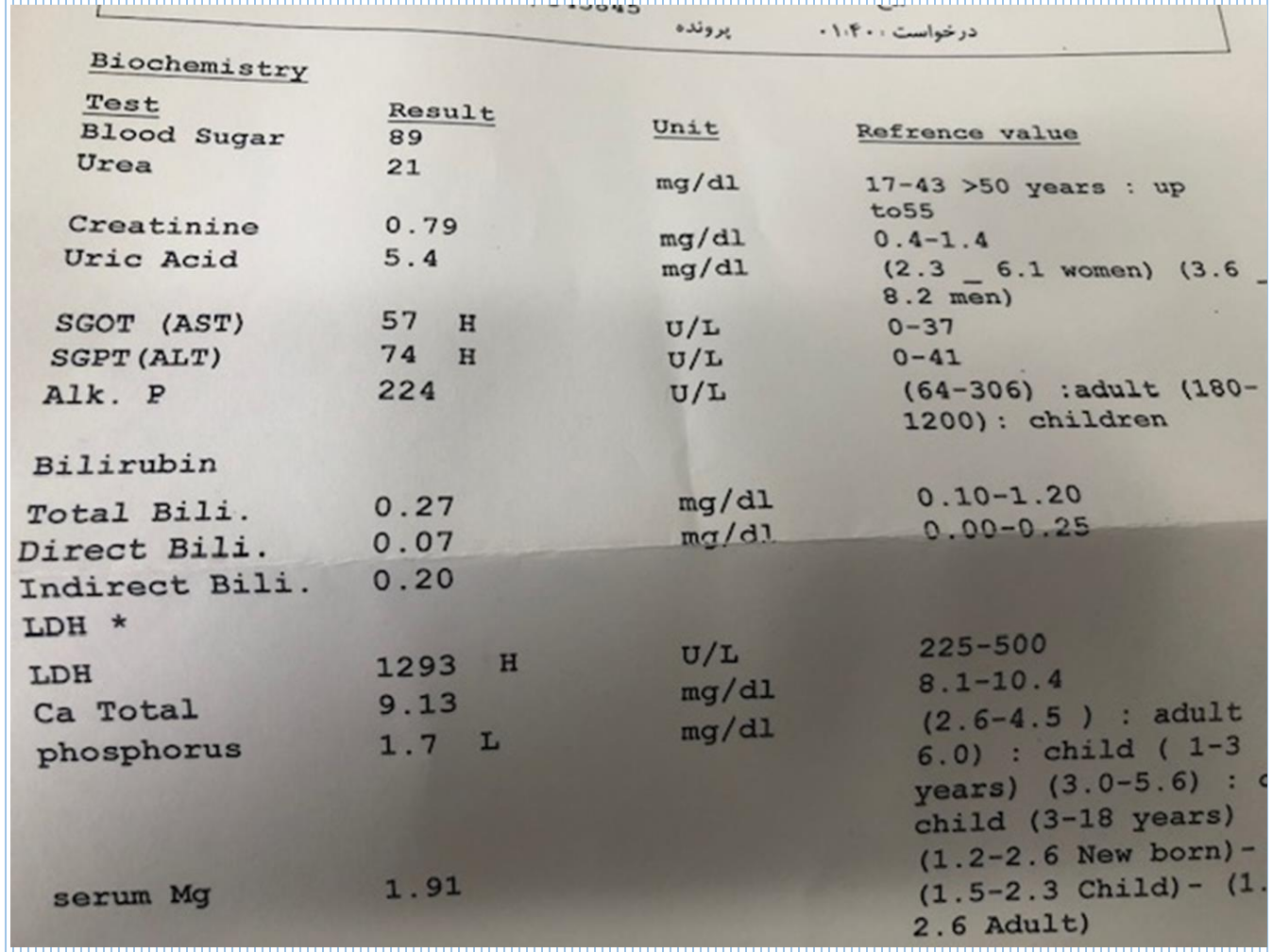
- Creatinin clearance
- AUC: carboplatin

$$CCr_{(mL/min)} = \frac{(140 - age) \times \text{Lean Body Weight (kg)}}{Cr_{(mg/dL)} \times 72}$$

- Hydration
- Sonography

Liver Assessment

- AST, ALT, ALP, Bili
- PT
- Alb
- Hbs Ag, HCV



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Biochemistry

Test	Result	Unit	Refrence value
Blood Sugar	89		
Urea	21	mg/dl	17-43 >50 years : up to55
Creatinine	0.79	mg/dl	0.4-1.4
Uric Acid	5.4	mg/dl	(2.3 _ 6.1 women) (3.6 _ 8.2 men)
SGOT (AST)	57 H	U/L	0-37
SGPT(ALT)	74 H	U/L	0-41
Alk. P	224	U/L	(64-306) :adult (180-1200): children
Bilirubin			
Total Bili.	0.27	mg/dl	0.10-1.20
Direct Bili.	0.07	mg/dl	0.00-0.25
Indirect Bili.	0.20		
LDH *			
LDH	1293 H	U/L	225-500
Ca Total	9.13	mg/dl	8.1-10.4
phosphorus	1.7 L	mg/dl	(2.6-4.5) : adult 6.0) : child (1-3 years) (3.0-5.6) : child (3-18 years) (1.2-2.6 New born)- (1.5-2.3 Child)- (1. 2.6 Adult)
serum Mg	1.91		

- Sonography for liver and biliary system

- Anthracyclines
- Taxanes
- Vinca alkaloids
- Imatinib
- 5 FU
- Etoposide
- Liposomal drugs

liposomal	Tbili 51.3-85.5 µmol/L: reduce recommended dose by 75% Tbili >85.5 µmol/L: omit dose
Etoposide	Tbili 20.5–51.3 µmol/L: reduce recommended dose by 50% Tbili 51.3–85.5 µmol/L: reduce recommended dose by 75% Tbili >85.5 µmol/L: hold etoposide
5-Fluorouracil	Omit for Tbili >85.5 µmol/L
Idarubicin	Tbili 20.5–51.3 µmol/L: reduce recommended dose by 50% Tbili 51.3–85.5 µmol/L: reduce recommended dose by 75% Tbili >85.5 µmol/L: omit dose
Imatinib	The recommended starting dose is 400 mg/day for adults with mild or moderate hepatic impairment (Tbili 1.5–3 x ULN with any ALT value). The recommended starting dose is 300mg/day with severe hepatic impairment (Tbili >3 x ULN and with any ALT value).
Methotrexate	Psoriasis or rheumatoid arthritis patients with hepatic impairment due to alcoholism, cirrhosis or other chronic liver disease should not receive methotrexate. High-dose methotrexate may have a prolonged half-life due to hepatic dysfunction and require additional monitoring and leucovorin therapy.
Paclitaxel	In general, dosage reduction of at least 50% is recommended with moderate or severe hyperbilirubinemia or substantially increased serum transferase levels. The results of a study with

Hemorrhagic Evaluation

- Platlet
- PTT, PT, INR
- CT?
- D-dimer
- Fibrinogen
- FDP

- Malignancies with hemorhhagic problem: M3-4-5, T ALL, GI cancers

Other lab tests

- Electrolytes: Na, K, Ca, Ph, Mg
- LDH
- Uric acid
- Tumor markers

- Nutrition status

Cardiac evaluation

- BP
- EKG
- Echocardography
- Troponin, CK MB

- Heart failure: antracylclins, anti Her 2
- Coronary spasm: capecitabin, 5FU
- QT prolongation: Arsenic trioxide
- Arrhythmia: cyclophosphamide

Oncologic emergency

- TLS
- Leukocytosis
- Cord compression
- Obstruction of air way
- Hypercalcemia
- SVC syndrome
- High ICP

Dose of Anticancer Drugs

- Most anticancer agents have a steep dose response relationship and a narrow therapeutic index
- Small variations in dose can lead to life-threatening toxicity or underdosing
- Proper dose: great importance, particularly in lymphoma or testicular cancer, and in adjuvant treatment (breast and colon cancer)

- The most relevant pharmacokinetic parameter : AUC of plasma concentration x time following a single dose
- AUC influenced by: dose, schedule, age, gender, height, weight, medications, metabolizing enzymes, transporters, clearance (RF & LF)
- For most anticancer agents, for minimize interindividual variation have been limited to normalizing doses based on body size (BSA).

- **BSA-based dosing**
- Obese and under weight
- LD1
- Cap dose

- **personalized medicine**

- **Weight-based dosing** (cladrabin, arsenic, melphalan)

- **Fixed dose (**Monoclonal antibodies, TKI, Checkpoint inhibitors)

- **AUC** (Carboplatin drugs that are cleared through glomerular filtration)

Fluoropyrimidines

- 5 Fu and capecitabine are contraindicated in enzyme deficiency of dihydropyrimidine dehydrogenase (DPD)
- Thymidylate synthase
- Testing for severe toxicity after fluoropyrimidine-containing regimen

Irinotecan

- (*UGT1A1*) genotypes that are associated with a poor metabolizer

6-mercaptopurine (6-MP)

- Thiopurine S-methyltransferase (TPMT)

- MTX