

# Regeneration, repair and cancer control

## THE ROLE OF THE SURGEON

### *Objectives:*

- **Functional reserve of organs**
- **Capacity to regenerate (adaptation)**
- **Practical limits of surgical resection**

# THE ROLE OF THE SURGEON IN CANCER CONTROL

- **Screening programmes (e.g. breast, prostate)**
- **Diagnosis (imaging, biopsy)**
- **Clinical assessment (incl. tumour staging)**
- **Operative treatment**
  - 'curative' (i.e. negative margins)
  - palliative (i.e. symptomatic)
- **Follow-up (detection of recurrence)**

# BIOPSY TECHNIQUES

- **Percutaneous**
  - **FNA for cytology**
  - **needle core biopsy for histology**
- **Open**
  - **incisional (usually for large mass)**
  - **excisional (e.g. breast, skin tumour)**

# CLINICAL ASSESSMENT OF CANCER PATIENT

## *Objective:*

- to ensure that the benefit of the treatment outweighs the potential risk of the procedure

## *Requirements:*

- knowledge of tumour biology/behaviour
- accurate tumour staging
- full assessment of intercurrent disease
- informed consent (avoid paternalism)

# OPERATIONS FOR CANCER

- 1. Preventive (e.g. proctocolectomy for FAP)**
- 2. Operations with curative intent**
  - en bloc resection avoiding spillage
  - conservative resection (ca breast, melanoma)
  - radical resection (stomach, pancreas)
- 3. Cytoreductive (e.g. ovarian ca, lymphoma)**

# OPERATIONS FOR CANCER (CONT'D)

## 4. Palliative (to treat or prevent symptoms)

- resection
- bypass

## 5. For metastatic disease (e.g. liver, lung)

## 6. Reconstructive (e.g. breast, jaw, rectum)

# ALTERNATIVES TO SURGICAL TREATMENT FOR CANCER

- **Radiotherapy**
  - external beam, brachytherapy, IORT
  - kills dividing cells (DNA x-linking etc)
  - early and delayed side effects
- **Chemotherapy**
  - single agent or combined
  - palliative/adjuvant/neo-adjuvant
- **Hormonal therapy (e.g. breast, prostate)**
- **Immunotherapy (non-specific, specific)**
- **Gene therapy**

# FUNCTIONAL RESERVE OF ORGANS

*Organs with a considerable functional reserve:*

- kidney
- liver
- small bowel
- pancreas

*Organs with limited functional reserve:*

- spleen
- bladder
- brain



# REGENERATIVE CAPACITY

## *Organs with marked regenerative capacity*

- liver
- kidney
- small bowel

## *Organs with little or no regenerative capacity*

- pancreas
- central nervous tissue

# ADAPTATION TO SURGICAL RESECTION

- Compensatory hypertrophy of opposite kidney
- Restoration of liver volume after hepatectomy
- Growth of splenunculus after splenectomy (ITP)
- Villous hyperplasia of small bowel remnants

*Note: organs capable of marked adaptive growth are generally those with a high rate of normal cell turnover*

# INTESTINAL ADAPTATION

## *The phenomenon*

- marked post-resectional hyperplasia
- kinetic: increased crypt cell production rate
- structural: villous growth, espc. downstream
- functional: increased absorptive capacity

## *Control mechanisms*

- luminal nutrition (adverse effect of TPN)
- endogenous secretions (bile, pancreatic juice)
- tropic hormones (enteroglucagon)

# CONCLUSIONS

- **Extent of organ resection for cancer should generally not exceed functional reserve  $\pm$  regenerative capacity**
- **Compensatory hyperplasia can sometimes be stimulated (e.g. portal vein embolisation)**
- **Resection beyond functional reserve requires either replacement therapy (e.g. pancreas) or transplantation (e.g. liver)**