Esophageal Cancer Cases

Quiz Questions:

Relationship between proto-oncogene and oncogene?

Examples:

Ras

HER2/neu

MYC

Tumor Suppressor Genes

FAP Prophylactic Surgery

- Total proctocolectomy with ileoal pouch
- Total colectomy with ileorectal anastomosis
- Proctocolectomy with end ileostomy

Lynch Syndrome Prophylactic Surgery

- No role for prophylactic colon surgery
- Prophylactic hysterectomy with BSO

BRCA 1/2 Prophylactic Surgery

- Bilateral mastectomy reduces lifetime risk 90%
- Surveillance is a reasonable option
  - Yearly mammogram
  - Yearly breast MRI

BRAC 1/2 Prophyactic Surgery

- Prophylactic BOS age 35-40 or after childbearing
- Reduces risk of ovarian cancer 80%
- Surveillance not as effective
  - Transvaginal ultrasound
  - CA-125 screening

MEN 2A/2B or FMTC Prophylactic surgery

- Timing of thyroidectomy depends upon risk category
- Highest risk: Throidectomy within first year of life
- High risk: Thyroidectomy by age 5 or if calcinonin elevated
- Moderate risk: surveillance starting age 5
  - physical exam
  - neck ultrasound
  - serum calcitonin

FAP

Median age of dx 39

- Duodenal and ampullary tumors
- Gastric polyps
- Thyroid tumors
- Desmoid tumors

FAP screening

Colonoscopy age 10-12 EGD for duodenal polyps at age 20-30 CT 1-3 years after colectomy and q5 yers in those with family hx of desmoids

Lynch

Amdterdam Criteria

(Bethesda Criteria)

Mean age dx colon cancer 44-61 Predominant right side colon cancer Lifetime penetrance 82%

Lynch Other Cancers

- Endometrial
- Stomach
- Ovarian
- Urinary tract
- Biliary Tract
- Small bowel
- CNS

Lynch Screening

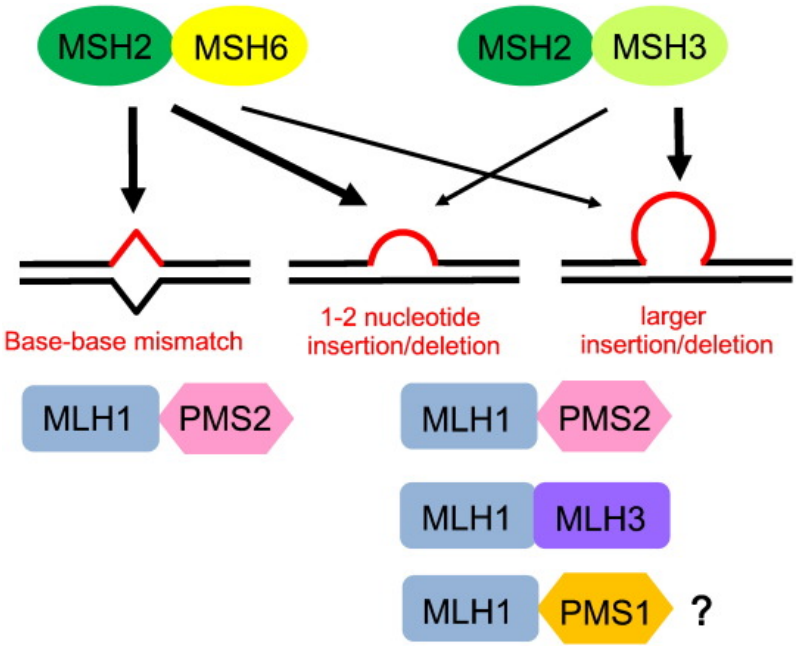
Colonoscopy q1-2 years staring age 20-25

Women with Lymch have 25-60% lifetime risk of endometrial cancer 45-12% lifetime risk of ovarian cancer Male: 1.2% risk of breast cancer (0.1% in general populations)

MMR and MSI

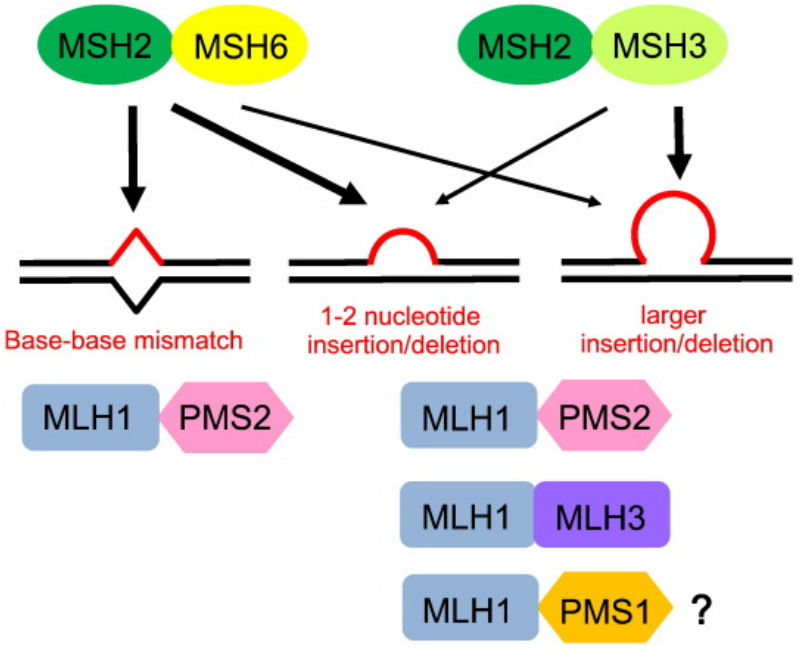
Greater than 90% of LS tumors are MSI-high (MSI-H) and/or lack expression of at least one of the MMR proteins by IHC. Ten percent to 15% of sporadic colon cancers exhibit abnormal IHC and are MSI-H most often due to abnormal methylation of the MLH1 gene promoter, rather than due to LS. Mutant BRAF V600E is found in many sporadic MSI-H CRCs and is rarely found in LS-related CRCs. There are some tumors that will have MLH1 methylation but lack a BRAF PV.

DNA Mismatch Repair Proteins

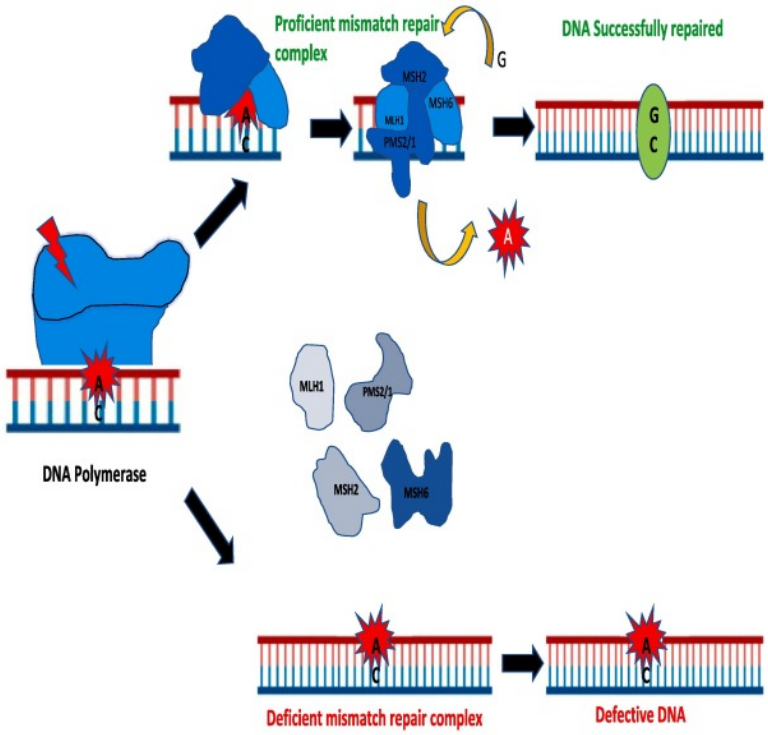


DNA Mismatch Repair Proteins

MLH1 PMS1 MSH6 MSH2 MSH5


MSH2
MSH6
MSH2
MSH3
Base-base mismatch
1-2 nucleotide insertion/deletion
larger insertion/deletion
MLH1
PMS2
MLH1
PMS2
MLH1
MLH3
MLH1
PMS1
?

DNA Mismatch Repair Proteins



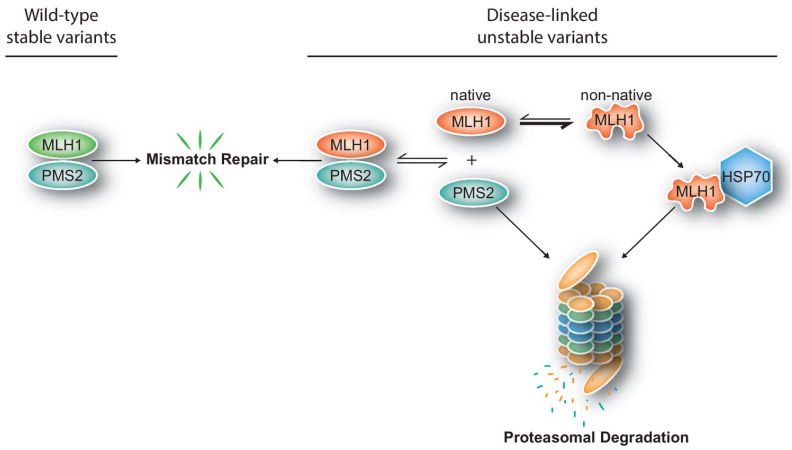
Mismatch Repair Proteins in Lynch Syndrome

Lynch Syndrome can be caused by loss of expression of:

- MLH1
- PMS1
- MSH6
- MSH2
- MSH5

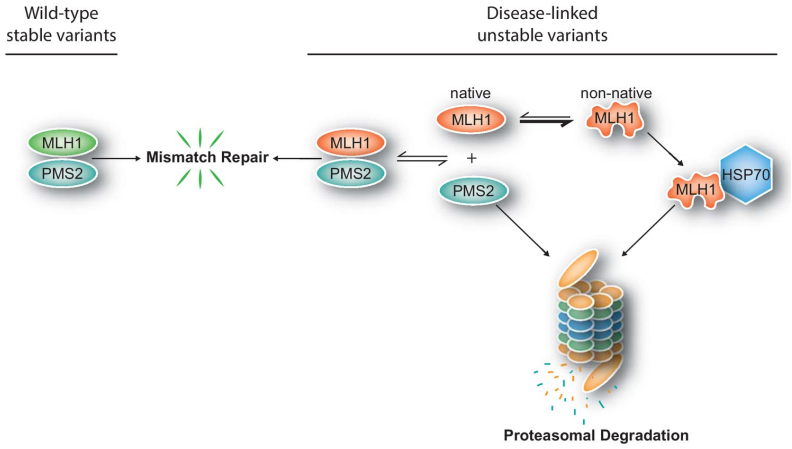
MLH1 and PMS Dimer in Mismatch Repair

wild-type MLH1 and PMS2 form a stable heterodimer



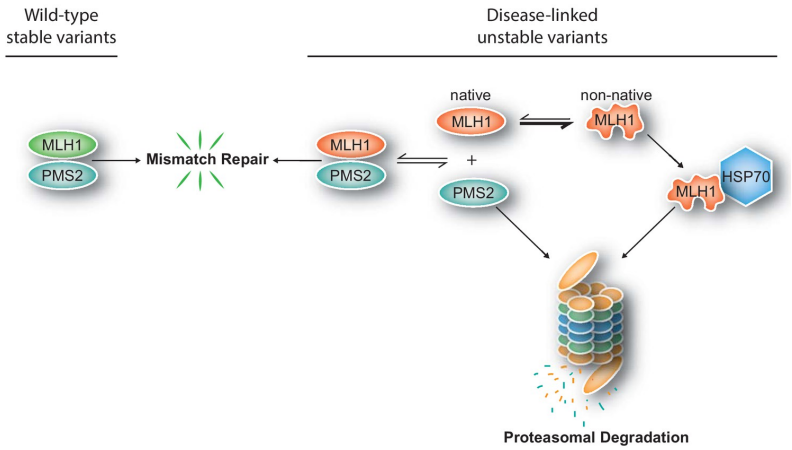
MLH1 and PMS Dimer in Mismatch Repair

Mutant MLH1 fails to form a stable heterodimer



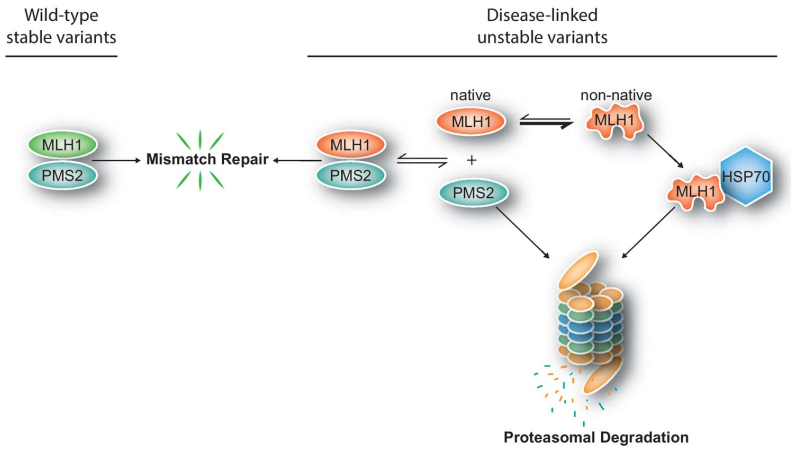
MLH1 and PMS Dimer in Mismatch Repair

Mutant MLH1 fails to form a stable heterodimer $\rightarrow$ PMS2 is degraded



MLH1 and PMS Dimer in Mismatch Repair

If MLH1 is mutated → PMS2 protein is *not* detected



Colon Polyposis: >10 adenomatous polyps

- Classical FAP
- Attenuated FAP (AFAP)
- MUTYH-associated polyposis (MAP)
- Colonic adenomatous polyposis of unknown etiology (CPUE)

Colon Polyposis: >4 hamartomatous polyps

- Puetz-Jaghers
- Juvenile Polyposis Syndrome
- Cowden Syndrome/PTEN Hamartoma Tumor Syndrome

Serrated Colon Polyps

5 serrated polyps/lesions proximal to the rectum, all being 5 mm in size, with 2 being 10 mm in size OR >20 serrated polyps/lesions of any size distributed throughout the large bowel, with 5 being proximal to the rectum

Muir-Torre Syndrome

Muir-Torre syndrome refers to individuals with LS who have LS-associated skin findings of sebaceous adenomas/carcinomas or keratoacanthomas.

BRCA 1/2

BRCA1: 87% ifetime risk of breast cancer and 40-60% risk of ovarian vanver

BRCA2: 80% ifetime breast cancer 1nd 15-27% ovarian cancer - Elevated risk of prostate, pancreas, melanoma

Male carriers of BRCA2: 8.9% lifetime risk of breast cancer

BRCA risk factors:

- Breast cancer dx before age 40
- Bilateral breast vcancer
- Breast and ovarian cancer
- 2 family members with breast cancer < age 50
- Family history of breast and ovian
- Family history of male breast cancer

Attenuated FAP

~30 polyps 70% penetrance by age 80 - mean age at dx 50-55

Li-Fraumeni

Mutation of TP53 tumor suppressor gene

- Breast cancer 90% by age 50
- Sarcoma
- Leukemia
- Brain tumors
- Andrenocortical carcinoma

Breast cancer in Li-Fraumeni

Mastectomy favored to avoid radiation therapy

Bilateral prophylactic mastectomy recommended

p16 = CDKNA2A mutation

- Increased risk of melanoma
  - Familial Atypical Multiple Mole Melanoma (FAMMM)
  - Familiarl llAtyopical Multiple Mole-Pancreatic Carcinoma (FAMMMPC)
- Melanoma penetrance 58-92% by 80
- Pancreatic cancer penetracne 17% by age 75

FAMMM

- Malignant melanoma in one or more first degree or second-degree relatives
- High total body nevus count
- Nevi with certain features on microsopcy

Genetic testing not performed as only 50% of FAMMM harbor a mutation in CDKNA2A

Neurofibromatosis 1

Mutation in NF1 tumor suppressor gene

- Multiple neurofibromas
- Cafe au lait spots
- Lisch nodules (hamaartoma of the iris)

Risk of - NPNST - PHeochromocytoma - Astrocytoma - Leukemai

NF1 diagnosis

Two or more of the following 6 criteria:

- Six or more café-au-lait macules
- Two or more neurofibromas or one plexiform neurofibroma
- Axillary or inguinal freckling
- Optic glioma
- Two or more Lisch nodules
- Characteristic osseous lesions
- A first degree relative with NF1

Neurofibromatosis 2

NF2 gene

- Multiple neurofibromas
- Cafe au lait spots
- Bilateral vestibular shwannomas
- CNS tumors

Most affected develop bilateral schwannomas by age 30 with average age of death 26

Annual surveillance MRI stating age 10-12 and hearing evaluationm

PTEN

Cowden Syndrome Mutation in *PTEN* tumor suppressor gene

- Mucocutaneous facial lesions
- Macrocephaly
- Bilateral breast cancer
- Thyroid and endometrial tumors
- Hamartomatous polyposis of the GI tract

MEN1

- Mutation of MENIN tumor supressor
- Parathyroid
- Pitutiary
- Pancreatic islet cells

Hyperparathyoidism usually first presentaiotn Most common pancreatic tumor is non-functional

Dx by 2/3 of following:

- Parathyroid adenoma/hyperplasia
- Pancratic islet cell tumors
- Pituatiary tumors

MEN1 screening

Surveilance with serum prolactin, IGF-1, factin glucose and insuslin starting age 5 Calcium„ chormogranin A, pancrea polypeptide glucaocon AP age 8 Serum gastrin starting age 20 Brain MRI starting age 5 Abdomeal CT/MRI stagting age20

MEN1 surgical treatment

Parathyroidectomy 3.5 gland or 4 gladn with autotransplantation

Pancreatic tumor resection if >2cm

Pituitary tumors resected via transsphenoidal

MEN2 Famly of Syndromes

- RET proto-oncogene
- Medullary thyroid cancer in almost 100%
- MEN2A
  - pheochromocytoma in 50%
  - Parathyroid hyperplasia in 20-30%

-MEN2B - pheochromocytoma in 50% - Megacolon - Marfinoid habitus - Ganglioneromas - Mucosal neuromas

MEN 2 Prophylactic surgery

Prophylactic total thyroidectomy

Testing for pheochromoyctoma prior wtih adrenalectomy prior

Monitor calcitonin and CEA after thryoidectomy

Orientation Handbook

References