1 | sources source

1.1 | assignment: `https://nuevaschool.instructure.com/courses/3087/assignments/56036`

1.2 | reading: Hallmarks of Cancer PDF

2 | Flow

2.1 | Abstract

2.1.1 | hallmarks include

1. sustaining proliferative signaling
2. evading growth suppressors
3. resisting cell death
4. enabling replicative immortality
5. inducing ingiogenesis
6. activating invasion and metastasis

2.1.2 | theese hallmarks are newer

1. reprogramming of energy metabolism
2. evading immune destruction

2.1.3 | underlying

1. genome instability
   (a) genetic diversity that expedites acquisition of hallmarks
2. inflammation
   (a) ”fosters multiple hallmark functions”

2.2 | Introduction

2.2.1 | Cancer cells evolve into cancer cells because they need to be cancer cells??

1. **TODO** why do tumors have ”the need … to acquire the traints that enable them to become tumorigenic and ultimately malignant”? question

2.2.2 | tumors are not simple / idle 'insular masses of proliferating cancer cells'

2.2.3 | "recruited" normal cells (or 'stromal cells') are active parts of the tumor

2.2.4 | 'the biology of tumors can no longer be understood simply by enumerating the traits of the cancer cells but instead must encompass the contributions of the "tumor microenvironment" to tumorigenesis.'

2.2.5 | purpose is to consider new hallmarks that have been found or note that old ones weren't as general as we thought

2.3 | section: 'An Emerging Hallmark: Evading Immune Destruction'

2.3.1 | the immune system usually eradicates the 'formation and progression of incipient neoplasias, late-stage tumors, and micrometastases', so why not in these cancers?

2.3.2 | 'long standing theory of immune surveillance' -> something went interesting

1. 'cells and tissues are constantly monitored'
2. surveillance should elim cancer cells before they grow into tumors
3. thus, grown tumors have either hid from surveillance or limited the 'extent of immunological killing'

2.3.3 | more cancer in immunocompromised individuals

1. but these are virus-induced cancers
   (a) so helping these people = reducing viral infilltration
2. other cancers still evade the immune system

2.3.4 | 'genetically engineered mice and clinical epidemeology suggest that the immune system' actually hurts cancer

1. mice that are engineered to lack some immune parts got cancer faster/stronger/more
   (a) these guys are important in fighting cancer
      i. CD8^+ cytotoxic T lymphocytes (CTLs)
      ii. CD4^+ T_{h1} helper T cells
      iii. natural killer (NK) cells
   (b) 'demonstrable increase in tumor incidence'
   (c) lacking multiple -> 'more susceptible to cancer development'
   (d) 'both the innate and adaptive cellular arms of the immune system are able to contribute significantly to immune surveillance and thus tumor eradication' conclusion

2.3.5 | transplantation experiments

1. cancer cells from immunodeficient mice have a bad time in normal mice
2. cancer cells from normal mice can initiate tumors in both types of hosts
3. maybe some cancer cells are more easily detected and those would normally die in normal hosts but live in comprimised hosts, but when transplanted they meet a competent immune system and die conclusion
4. Open question: do some carcinogens tend to induce more/less immunogenic cancer cells? nextstep

2.3.6 | the immune system probably includes antitumoral responses

1. patients with colon and ovarian tumors who have lots of CTLs and NK cells have better prognosis
   (a) evidence is not as strong for other cancers nextstep
2. immunosupressed organ recievers got cancer from the donor
   (a) suggests doner had immune system which held cancer down until organ was transplanted

2.3.7 | TODO 'still, the epidemiology of chronically immunosupressed patients does not indicate significantly increased incidences of the major forms of nonviral human cancer'

2.3.8 | TODO something about HIV patients who lack T and B cells and how they should still be able to fight cancer with NK cells and CTLs

2.3.9 | that was oversimplified as the tumor might also be actively supressing immune responses

1. may 'paralyze infiltrating CTLs and NK cells by secreting TGF-β or other immunosuppressive factors'
2. 'more subtle mechinisms .. recruitment of inflamatory cells that are actively immunosuppressive'
   (a) 'regulatory T cells (Tregs) and myeloid-derived suppressor cells (MDSCs)'

2.3.10 | it is so far unclear whether the immune system plays a large enough role to be considered a hallmark of cancer

3 | Vocab

3.1 | neoplastic disease

3.1.1 | anything that causes tumor growth (malignant or benign)

3.2 | ostensibly

3.2.1 | maybe 'technically'?'

3.3 | **tumor microenvironment**

3.3.1 | **presumably inflammation, recruited normal cells, and other stuff that helps the tumor grow**

3.4 | **pathogenisis**

3.4.1 | **evolution of 'pathogen' (cancer)**

3.5 | **ancillary proposition**

3.5.1 | **maybe the starting / base proposition**

3.6 | **insular masses**

3.6.1 | **stagnant or something, simple**

3.7 | **heterotypic interactions**

3.7.1 | **many types of interactions**

3.8 | **tumorigenisis**

3.8.1 | **the growth / development of a tumor?**

3.9 | **neoplasias**

3.9.1 | **new uncontrolled growth of cells**

3.10 | **micrometastases**

3.10.1 | **clumps of cancer cells that spread around the body**

3.11 | **etiology**

3.11.1 | **study of cancer?**

3.12 | **immunogenic**

3.12.1 | **easily detected by the immune system**

3.13 | **immunoediting**

3.13.1 | **"natural selection" by the immune system**

3.14 | **prognosis**

3.14.1 | **a prediction of the outcome of a cancer (or disease in general, apparently)**