Anti-Cancer Peptides (ACPs):

- Cationic (positive charge)
- AMPs (antimicrobial peptides)
- 5–50 amino acids long
- α-helix or β-sheet secondary structure (but some have extended linear)
- Molecularly targeted (penetrating) or binding peptides
- Common amino acids: **glycine, lysine, and leucine**
- Histidine peptides can induce cancer cytotoxicity
- Glutamic and aspartic - anti-proliferative
- Cysteine residues don't hurt cancer cells, but stabilize and maintain domain structures
- Methionine can be eaten by cancer to grow
- Phenylalanine - present in cancer & can be used to target cancer membrane
- Tryptophan - for cell-penetrating peptides helps to enter membrane and bind to major groove
- **majority of ACPs contained 21-30 amino acids and were predominately composed of glycine, lysine and leucine**
-

Cancer Cells & Interaction:

- Large surface area
- Negative bilayer
- Higher membrane fluidity (inhibits lysis)
- Peptides use electrostatic/hydrophilic interactions to interact with cancer cells
- Less sphingomyelin and less asymmetric distribution
- pH 6.5

List of Anti-cancer peptides:

1. LL-37
2. BMAP-27
3. BMAP-28
4. Cercopin A
5. Lactoferrin
6. Defensins
7. Tritrpticin
8. Indolicidin

Data:

Possible Features: name, amino acid sequence, net charge, secondary structure, length, hydrophilic component, anionic component, cationic component, binding or penetrating, kills cancer, cancer-targeted (active, or not)

Sequence

Squence length

Origin

Type (native vs. synthetic)

Nature(anti- cancer or anti bcaterial)

Linear or cyclic - Linear peptides are more flexible and can have more nonspecific interactions with the cell membrane, while cyclic peptides are more rigid and can have more specific interaction

C- terminal vs N- terminal

Molecular weight average

Absent anio acids

Common amino acids

Net charge

Half life

Instability index

Aliphatic index

GRAVY - score used to predict hydrophlisity

So far, ACPs can be designed to attach to molecules that are uniquely or abundantly present on the surface of cancer cells, but not normal cells, this makes them detectable through imaging techniques. Also, we noticed that our data sets should include features like the amino acid sequence, net charge, secondary structure, length, and the cancer-targeted.

How are Anticancer peptides used for cancer diagnosis?

- Biomarker detection: ACPs can be designed to bind specifically to cancer cell surface markers or tumor-associated antigens.
- If ACP binds to cell then it is cancer, if not, then its a normal cell