**PROJECT GOALS**

To develop a general organization of selected treatment technologies, Project goals are as followed:

1. Classification of Technologies for Treatment of Health Care Related Illness
   - Based on the nanotherapeutics selected, technologies associated with treatment of, for example, cancer tumors will be studied and classified.

2. Identification of Nanoparticles used in Each Technology
   - Each technology uses a unique type of nanoparticle and these will be identified, and their role highlighted.

3. Understanding the Role of the Nanoparticle in Each Technology
   - This helps gets the right amount and interventions at the molecular scale for curing diseases or repairing damaged tissues.

**MOTIVATION & RELEVANCE TO RESEARCH**

Nanotechnology as known as “tiny” science due to it being on the molecular scale. Many use the term nanoparticles interchangeably with nanotechnology. It has very impactful outcomes including applications in materials, the environment, health care, and energy. Nanotechnology has a wide range of applications within the healthcare field. Nanoparticles can diagnosis and help treat early-stage cancer and other diseases. Nanoparticles offer numerous advantages in drug delivery systems which can achieve better therapeutic action, bioavailability, and reduce toxicity.

Nanotherapeutics uses nanotechnology products for highly specific medical interventions at the molecular scale for curing diseases or repairing damaged tissues. It is a two-component drug delivery. This helps get the right amount and combination of the therapeutic to the right place which is a new shift in advanced technology. It may prove to be the first cutting-edge field that reflect the new realities of targeted medicine. An understanding of the selected treatment approaches that use nanoparticle to either make a diagnostic of treat, for example cancer tumors is valuable to improve the knowledge related to the potential helpful possibilities that they offer in health care.

**METHODS & METHODOLOGY**

The learning challenge here is the classification of the treatment technologies and the use of the different nanoparticles. The Resources include the information found in the literature, the skills and background from the ChE 4990 class, the discussions with Dr. Arce, poster format from previous contributions at the TTU event. The Prototype of Innovative Technology is the Table with the technologies discussed and organized (see section on Results). Organizational tools include the ChE 4990 Course Syllabus and outline of the project.

**ROLE OF NANOTHERAPEUTICS ON CANCER TUMOR TREATMENT**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Treatment: Targeting Tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Detects early-stage cancer</td>
<td>- Active targeting</td>
</tr>
<tr>
<td>- Nanoparticles can be paired with:</td>
<td>- Triggered drug release components</td>
</tr>
<tr>
<td>■ Magnetic Resonance imaging, MRI</td>
<td>- Conjugation of targeting ligands to nanoparticle surface</td>
</tr>
<tr>
<td>■ Positron emission tomography, PET</td>
<td>- Passive targeting</td>
</tr>
<tr>
<td>■ Computerized tomography scans, CT scans</td>
<td>- Enhanced permeability and retention</td>
</tr>
</tbody>
</table>

- Increases the concentration of nanoparticles in a tumor

**DIFFERENT TYPES OF NANOPARTICLES USED IN NANTHERAPEUTICS**

**Liposomes:***
- Small, spherical shaped
- nanoscale sphere
- Some drugs can be incorporated into liposomes
- Not readily released from the inside
- Due to poor avidity for acidic environments

**Carbon-Nanotubes:**
- Single walled
- Composed of monolithic cylindrical graphene
- Multiple walled
- Composed of concentric graphene
- Provide a large surface area
- Stable thermally and electrically

**Magnetic Nanoparticles:**
- Paired with magnetic material
- Iron
- Nanoparticles are activated by magnetic field presence
- Novel drug delivery method

**Dendrimers:**
- Ideal delivery system
- high encapsulation capability
- High water solubility

**Golds Nanoparticles GNP:**
- Used in cancer treatment
- Remarkable compatibility
- Tunable stability
- Low toxicity

**RESULTS & DISCUSSION**

Nanotechnology is a promising area for diagnosis and treatment for cancer and other diseases. There still needs to be more research to fix the limitations of the technology. As for future work, a certain nanotechnology will be test for accuracy and precision within a certain cancer tumor.

**CONCLUSIONS & FUTURE WORK**

**REFERENCES**


References

**ACKNOWLEDGEMENTS**

Dr. Pedro Arce
Dr. Cynthia Rice