| Indication                                | Target                                      | Therapeutic Description                                                                 | Stage of Development | Patents                                                                                                                                                                                                 | Faculty                          |
|-------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Tumor & Ocular Angiogenesis               | VEGF activation                             | Fusion peptide inhibitor based on Histatins                                             | Preclinical: in vivo | US Patent 10,800,822 Nationalized in EP, CN and JP                                                                                                                                           | Vinay Aakalu                     |
| Breast Cancer, Estrogen Positive          | Estrogen Receptor                           | Brain penetrating Selective Estrogen Receptor Degraders                                  | Preclinical: In vitro | Nationalized in US, EP, CN, JP, SK and CN                                                                                                                                                  | Greg Thatcher, Rui Xiong and Debra Tonetti |
| Oncology                                  | BET Bromodomain Inhibitors                  | BET proteins are involved in transcriptional and cell cycle regulation.                  | Preclinical: in vitro | Nationalized in US, EP, CN and CA                                                                                                                                                      | Greg Thatcher and Rui Xiong       |
| Oncology                                  | Initial data in metastatic breast cancer, as well as colon, liver, lung, prostate, and skin cancer | Engineered HSV oncolytic virus for cancer immunotherapy                                  | Preclinical: in vivo | Nationalized in US, EP, AU, CN, SK, JP and IN                                                                                                                                            | Bin He                           |
| Anti-Cancer Drug Platform With Potential as a Mono or Combo Therapy | AD5/35.IR-E1A/MADD is a new capsid-modified Ad5 vector developed to specifically target tumor cells following intravenous or intratumoral application with a reduced immune response. | MADD up-regulation in cancer, its role in regulating apoptosis, and the combination of MADD knockdown with chemotherapy drugs | Preclinical: in vitro | US Patents 11,273,172 and 7,910,723 Potential systemic delivery                                                                                                                      | Bellur Prabhakar, Shikla Saini & Aditi Mathur |
| Tumor & Ocular Angiogenesis               | Selective VEGF regulation through KAI       | Peptide based inhibitor of VEGF activation                                              | Preclinical: in vivo | AU Patent Allowed Nationalized in EP, NZ, JP and CN Divisional in SP                                                                                                                     | Kaori Yamada & Asrar Malik       |
| Indication                        | Target                      | Therapeutic Description                                                                 | Stage of Development                                                                 | Patents                                      | Faculty                        |
|----------------------------------|-----------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------|
| Prostate Cancer                  | PSA and TEM8                | Vaccine combining a PSA (Prostate specific) peptide and a TEM-8 (Tumor endothelial marker 8) peptide plus GM-CSF | Phase I: PSA peptide vaccine                                                        | US Patent 8,557,777                         | David Peace                    |
|                                  |                             |                                                                                        | Preclinical: in vivo PSA peptide vaccine/TEM-8 peptide                              |                                             |                                  |
| Metastatic Breast Cancer (BC) Cell Models | Estrogen Receptor & specific kinases | When BC Mets become resistant to tamoxifen, ER-targeting agents become a valuable therapeutic option. | Pre-IND                                                                 | Material license available                  | Debra Tonetti                   |
| Metastatic Breast Cancer (BC) Cell Models |                             |                                                                                        |                                                                                      |                                             |                                  |
| Ovarian Cancer                   | Unknown                     | Verticillins have shown promising anticancer qualities                                 | Preclinical: in vitro                                                               | Nationalized in US and EP                  | Joanna Burdette                 |
| Oncology, specifically Melanoma, MCL | HDAC6                      | Potent and Selective Inhibitors of Histone Deacetylase 6 (HDAC6)                        | Preclinical: in vivo                                                                | US Patent 10,456,394                       | Alan Kozikowski, SS Shen & Joel Bergman |
| Triple Negative Breast Cancer (TNBC) | HDACs & kinases             | Inhibition of specific kinases leads to increased efficacy of HDAC3 inhibitors in TNBC models | Preclinical: in vitro                                                              | Research Tools, No Patents                  | Pavel Pasha, Petukhov & Jonna Frasor |
| Oncology                         | PARP agents                 | Cell Lines for determining PARP agents function                                        | Preclinical: in vivo                                                                | Material License                           | Leslyn Hanakahi                 |
| Oncology, specifically Melanoma, MCL | Epigenetics: HDAC           | Highly potent selective HDAC6 Inhibitors                                              | Preclinical: in vivo                                                                | US Patent 9,409,858                       | Alan Kozikowski                 |
| Oncology                         | RAD51 DNA repair pathway    | Inhibitors of RAD 51 DNA repair pathway as a target for cancer therapy                 | Preclinical: in vivo                                                                | JP Patent Issued                           | Alan Kozikowski & Philip Connell |
| Oncology                         | MLK kinase                  | Dual MLK3/MAP4k4 inhibitors for treating cancers                                       | Preclinical: in vitro                                                              | In preparation                            | Greg Thatcher Ajay Rana         |
| Indication      | Target       | Therapeutic Description                                                                 | Stage of Development                  | Patents          | Faculty            |
|-----------------|--------------|----------------------------------------------------------------------------------------|---------------------------------------|------------------|--------------------|
| Oncology        | Notch 4      | Human Notch4 "Mini" Decoy                                                              | Preclinical: in vitro                | In preparation   | Jan Kitajewski     |
|                 |              |                                                                                        | Small scale biologics produced       |                  | Timothy Sargis     |
| Oncology        | Syk Kinase   | Novel Syk inhibitors potently suppress the growth of leukemia cells and overcome resistance | Preclinical: In vitro                | Provisional Filed| Won Hwa Cho        |
| Oncology        | AKT E17K mutant | Akt E17K mutant-specific inhibitor                                                      | Preclinical: In vitro                | In preparation   | Won Hwa Cho        |
| Indication                                      | Target                                      | Therapeutic Description                                                                 | Stage of Development                           | Patents                                      | Faculty                        |
|------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------|---------------------------------|
| Amyotrophic Lateral Sclerosis (ALS)            | Neuregulin Signaling                        | GlyB4 Fusion with Neuregulin Heparin-Targeting Domain to Block Neuregulin Signaling       | Preclinical: in vivo                          | US Patent 7,527,794<br>US Patent 7,994,123<br>EP Patent 1,824,879 | Jeff Loeb                      |
| Alzheimer’s Disease                            | Neuregulin Signaling                        | Treatment with GlyB4, a potent, targeted antagonist that blocks the endogenous neuregulin signaling | Preclinical: in vivo                          | PCT Patent Pending                         | Jeff Loeb                      |
| Sleep Apnea                                    | Serotonin                                   | Serotonin Receptor Antagonists +/- Selective Serotonin Reuptake Inhibitor +Ondansetron/Fluoxetine (repurposing) | Phase I: Human clinical pilot showing efficacy; pre-clinical dose and dose-ratio optimized; pre-IND meeting with FDA | US Patents 6,331,536<br>8,512,751<br>EP Patent Issued | Roman Rariy and Michael Hefferman |
| Depression and other neurological diseases      | LPC transporter at the blood brain barrier, MFSD2a | Deliver EPA to brain by transporting LPC-EPA through blood brain barrier transporter, MFSD2a | Preclinical: in vivo                          | US Patent 10,555,957                         | Papasani Subbaiah               |
| Depression, Anxiety, & Fear                    | Allopregnanolone Stimulators                | Derivatives of the neurosteroid allopregnanolone for non-responders of SSRIs             | Preclinical: in vivo                          | US Patent Pending Nationalization US, EP, CA, and AU | Graziano Pinna                 |
| PTSD, anxiety disorders, premenstrual dysphoria, & impulsivity | PPAR-alpha receptor | PEA induces an improvement of behavioral deficits by affecting the expression of target genes involved in cell proliferation, cell differentiation and in immune and inflammation responses | Preclinical: in vivo                          | US Patent Pending                         | Graziano Pinna & Locci Andrea  |
| Charcot Marie Tooth (CMT), Autism, Neuroprotection | HDAC6                                       | Nanomolar inhibitors of HDAC6 highly selective over other HDACs                          | Preclinical: in vivo                          | US Patents 10,456,394 and 9,409,858<br>JP Patent Issued | Alan Kozikowski               |
| Indication                                      | Target                              | Therapeutic Description                                                                 | Stage of Development                  | Patents                                                                 | Faculty                          |
|------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------|----------------------------------|
| Pain Management                                | Mu Opioid Receptor                  | Partial Mu Opioid Receptor Agonists Derived from Akuamma Alkaloids                      | Preclinical: Receptor binding validation | Provisional Filed                                                      | Andrew Riley                     |
| Pain Management                                | kappa Opioid Receptor               | Kappa Opioid Receptor Agonist Derived from Akuammicine                                  | Preclinical: Receptor binding validation | Provisional Filed                                                      | Andrew Riley                     |
| Addiction                                      | Nicotinic Receptor                  | Subtype Selective Nicotinic Acetylcholine Receptor Inhibitors                           | Preclinical: Receptor binding validation | Provisional Filed                                                      | Andrew Riley                     |
| Alzheimer’s Disease                            | ABCA1                               | Non-Lipogenic ABCA1 Inducers for Type 2 Diabetes and Alzheimer’s Disease                 | Preclinical: in vivo                  | PCT Patent Pending                                                     | Greg Thatcher, Brian Layden, Mary Jo Ladu |
| Niemann-Pick                                   | Autophagy                           | Autophagy modulation with small molecules as a therapeutic strategy for neurodegenerative diseases | Preclinical: in vitro                | In preparation                                                          | Leslie Aldrich                   |
| Parkinson’s, Other Synucleinopathies           | Protein Kinase C mu or Src-Family Tyrosine Kinase | Utilized a demonstrator compound as inhibitors of protein kinase C mu and src family tyrosine kinase | Preclinical: in vitro | US Patent 8,618,063                                                     | Scott Brady                      |
| Alzheimer’s Disease                            | Calpain Protease                    | Utilized caspase inhibitors on a rodent model of AD                                    | Preclinical: in vivo                  | Nationalization                                                        | Greg Thatcher                   |
| Tolerance resulting from chronic opioid administration | Calcium Calmodulin Kinase (CaMKII) | Utilized an FDA approved drug & other preclinical compound inhibitors of CaM II kinase | Phase I: Compound successfully attenuated experimentally induced nerve hypersensitivity caused by opioid drugs in preclinical models; human clinical trial validated this approach | US Patents 7,776,819, 7,256,200 | Zaijie (Jim) Wang               |
| Metabolic and neurological disorders           | NAMPT activators                    | Enhancement of NAD through boosting of NAMPT activity or dietary supplementation alleviates AD symptoms in mice | Preclinical: HIT and Assay Optimization | PCT Patent Pending, Provisional Filed                                 | Rui Xiong, Gregory Thatcher, Kiira Ratia, Manel Ben Aissa |
| Indication                          | Target                                                                 | Therapeutic Description                                                                                      | Stage of Development                      | Patents                        | Faculty                      |
|-----------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------|------------------------------|
| **Wound Healing**                 | Pro-regenerative cytokines & growth factors                            | Interferon gamma activated mesenchymal stem cells                                                           | Preclinical: in vivo                     | US Patent 9,011,840            | Amelia Bartholomew           |
| **Niemann-Pick**                  | TMEM 97 or NPC 1                                                       | Small peptide (5 AA)                                                                                         | Preclinical: in vivo assays              | PCT Patent Pending            | Vinay Aakalu                 |
| **Asthma, Eosinophilic Esophagitis** | CCR3, eosinophils                                                      | Peptide therapeutic to compete against Eotaxin and other chemokines as a treatment for asthma               | Preclinical: In vivo                     | US Patent 10,363,286 and 11,167,012 | Steven Ackerman & Vadim Gaponenko |
| **Type 1 Diabetes**               | Targets both Notch3 and OX40 receptors on Tregs                        | Expansion of natural regulatory T cells by Jagged-1 and OX40L stimulation to suppress autoimmunity (through combination therapy or chimeric fusion protein) | Preclinical: in vivo                     | US Patents 10,696,946          | Bellur Prabhakar             |
| **Wound Healing**                 | CCR10                                                                  | Wound healing peptide with a novel target that greatly reduces healing time                                  | Preclinical: in vivo                     | Nationalized in US, EP, CA, MX, JP and SK | Richard Minshall             |
| Bone regeneration                 | Extracellular matrix                                                  | In vivo bioengineered exosome to create function/target specific and content release controled exosome cargo | Preclinical: in vivo                     | Nationalized in US, EP, AU, and CA | Sriram Ravindran             |
| COPD, multiple sclerosis and diabetes | Inhibitors of Keap1/Nrf2 Protein-Protein Interaction                 | Mechanism is validated by empirical validation in rodent                                                   | Preclinical: in vivo                     | US, EP, AU, CN, JP, CN Pending | Terry Moore                  |
| Indication                                      | Target                                                                 | Therapeutic Description                                                                                                                                                                                                 | Stage of Development                  | Patents                                                                 | Faculty                      |
|------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------|------------------------------|
| Autoimmune diseases including Type 1 Diabetes, Lupus, RA | Targets both Notch3 and OX40 receptors on Tregs                        | Expansion of natural regulatory T cells by Jagged-1 and OX40L stimulation to suppress autoimmunity (through combination therapy or chimeric fusion protein)                                                            | Preclinical: in vivo                  | US Patents 10,696,946, Continuation Patent Pending                      | Bellur Prabhakar             |
| Hematopoietic stem cell transplantation          | Multi-Chimeric Cells (MCC)                                             | Multi-Chimeric Cell (MCC) Therapy for Transplantation and Treatment of Immune Deficiencies and Genetic Disorders                                                                                                        | Pre-IND                               | Nationalized in US, EP, AU, CN, JP and CA                              | Maria Siemionow              |
| Rheumatoid Arthritis, Inflammatory Bowel Disease, Ulcerative colitis | Epigenetics: HDAC6                                                    | HDAC6 Selective Inhibitors: nanomolar and sub nanomolar inhibitors of HDAC6                                                                                                                                                 | Preclinical: Potent HDAC6 inhibitors successfully prevented cardiac organ transplant rejection in rodent model; also prevented experimentally induced ulcerative colitis in rodents | US Patents 10,456,394 and 9,409,858, JP Patent Issued | Alan Kozikowski              |
| CRISPR/Cas9                                     | DNA-editing platform                                                  | Engineered CRISPR/Cas9 plasmid for barcoding and to trace biological events and cell lineage                                                                                                                                  | Preclinical: in vitro                | Nationalized in US, EP, AU, CN and CA Provisional Filed                 | Bradley Merrill Ryan Clarke & Hannah Pennington |
| Allergy                                         | CSFR1                                                                  | Highly selective Colony Stimulating Factor 1 Receptor (CSF1R) Inhibitors                                                                                                                                                   | Preclinical: in vivo                 | In Preparation                                                         | Mike Johnson Gye Young Park |


## Immunology/Gene Therapy

| Indication                          | Target                                      | Therapeutic Description                                                                 | Stage of Development          | Patents                  | Faculty             |
|-------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------|-------------------------------|--------------------------|---------------------|
| Hematopoietic stem cell transplantation | GABA receptor                               | Repurposed drug/ GABBR1 agonist to improve HSC transplantation efficiency                | Preclinical: in vivo          | US Patent Pending       | Owen James Tamplin  |
|                                     |                                             |                                                                                         | Murine tested                 |                          |                     |
| Inflammation                        | Macrophages/Rspondin3 and LGR5              | Activating the Rspondin3-Wnt signaling pathway to treat a disease or condition characterized by excessive or unregulated inflammation | Preclinical: in vivo          | PCT Patent Pending      | Asrar Malik         |
|                                     |                                             |                                                                                         | Murine models                 |                          |                     |
| Indication                          | Target                        | Therapeutic Description                                                                 | Stage of Development                       | Patents                                           | Faculty                                |
|------------------------------------|-------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------|----------------------------------------|
| Sudden Cardiac Arrest              | Phosphatase inhibitors        | Peptide that mimics cooling for neuroprotection                                        | Preclinical:                                | US Patent 10,688,153 and 11,260,105              | Terry Vanden Hoek, Jing Li, and Xiangdong Zhu |
|                                    |                               |                                                                                        | Efficacy in mouse and pig models           | JP Patent 6,958,913                               |                                        |
|                                    |                               |                                                                                        |                                            | Nationalized in EP, CA and AU                    |                                        |
| Asthma, Eosinophilic Esophagitis   | CCR3, eosinophils             | Peptide therapeutic to compete against Eotaxin and other chemokines as a treatment for asthma | Preclinical: in vivo                       | US Patent 10,363,286 and 11,167,012             | Steven Ackerman & Vadim Gaponenko       |
|                                    |                               |                                                                                        | Eosinophil mouse model                     | EP Patent Issued                                  |                                        |
|                                    |                               |                                                                                        |                                            | Nationalized in CA                               |                                        |
|                                    |                               |                                                                                        | Preclinical: in vivo                       |                                                   |                                        |
|                                    |                               |                                                                                        | Efficacy in mouse models                   |                                                   |                                        |
|                                    |                               |                                                                                        | Nationalized in US, EP, AU, JP and CA      |                                                   |                                        |
|                                    |                               |                                                                                        |                                            |                                                   |                                        |
| Asthma                             | CSF1R inhibitor repositioned as Inhalable, small molecule treatment for asthma | Targeting early phase of asthma pathogenesis to treat disease rather than simply treating symptoms | Preclinical: in vivo                       | Nationalized in US, EP, AU, JP and CA            | Gye Young Park & Hyung-Geun Moom       |
|                                    |                               |                                                                                        | Efficacy in mouse models                   |                                                   |                                        |
|                                    |                               |                                                                                        | Preclinical: in vivo                       |                                                   |                                        |
|                                    |                               |                                                                                        | Efficacy in mouse models                   |                                                   |                                        |
|                                    |                               |                                                                                        | Nationalized in US, EP, AU, JP and CA      |                                                   |                                        |
|                                    |                               |                                                                                        |                                            |                                                   |                                        |
| Thrombosis, sepsis                 | Von Willebrand factor         | 6-mer Inhibitory peptide                                                              | Preclinical: in vivo                       | US Patent 9,796,757                              | Richard Minshall                       |
|                                    |                               |                                                                                        |                                            |                                                   |                                        |
| Acute Respiratory Distress Syndrome / Vascular leakage | End Binding Protein (EB3) inhibitors | 6AA Inhibitory peptide                                                               | Preclinical: in vivo                       | Provisional Patent Filed                    | Yulia Komarova                         |
|                                    |                               |                                                                                        | Efficacy studies in COVID19 and non-COVID19 induced ARDS completed in mouse models with additional ongoing toxicology studies in dogs |                                                   |                                        |
| Indication                        | Target                              | Therapeutic Description                                                                 | Stage of Development               | Patents                                      | Faculty     |
|----------------------------------|-------------------------------------|----------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------|-------------|
| Fibrosis /Osteogenesis           | Cell therapy                        | Alginate coated mesenchymal stromal cell transplantation                                 | Preclinical: In vivo               | PCT Patent Pending                          | Jae-Won Shin|
| Thrombosis, blood disorders, cancer | Platelet Adhesion Receptor Inhibitors | Inhibitory peptides of the interaction between 14-3-3 Protein and Glycoprotein Ib-IX Complex | Preclinical: in vivo               | US Patents 8,173,595 and 10,738,080         | Xiaoping Du |
| Pulmonary Arterial Hypertension  | Visfatin/Pbef/ Nampt inhibition      | Small molecule Inhibitors                                                              | Preclinical: in vitro              | US Patent Pending                           | Tom Driver  |
| Pulmonary Arterial Hypertension  | Nrf2-KEAP                           | Small molecules impacting Nrf2-KEAP interaction                                        | Preclinical: in vitro              | US Patent Allowed                           | Terry Moore |
| Myocardial Infarction and Lung Injury | Variable: Currently tested in TGFβ and SYK signaling | Drug loaded mannosylated albumin nanoparticles targeting distinct inflammatory and tissue-resident interstitial cells. | Preclinical: in vivo Efficacy in mouse models | Provisional Filed                           | Asrar Malik |
| Myocardial Infarction            | Protein tyrosine kinase Syk inhibitors | Piceatannol albumin nanoparticles (PANPs) selectively targeting profibrotic neutrophils | Preclinical: in vivo Efficacy in mouse models | Provisional Filed                           | Asrar Malik |
| Indication                        | Target                                           | Therapeutic Description                                                                 | Stage of Development                          | Patents                                                                 | Faculty                              |
|----------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------|--------------------------------------|
| Lymphatic filariasis             | Tetravalent filarial surface proteins            | Vaccine (Purified Protein and/or DNA)                                                    | Preclinical Studies - Proof of Concept studies in a primate model of infection ongoing | US Patent 10,072,054, EP, CN, IN, SG Patents Issued                     | Ramaswamy Kalyanasundaram            |
| Hepatitis C                      | NPC1L1                                           | Ezetimibe (Zetia – repurposed)                                                           | Preclinical: in vivo Validation in a mouse model of HCV infection | US Patents 8,673,288 and 9,034,863                                     | Susan Uprichard                      |
| Dental Caries/Biofilm inhibition | Bacterial pathogens that produce a biofilm matrix | Cerium (IV) nanoparticles that behave as biofilm inhibitors against the bacteria but not lethal to the cells at lower concentration. | Preclinical: in vitro Early stage, in vitro validation and cell toxicity evaluation | US Patent 10,835,556                                                    | Russell Pesavento                    |
| Herpes                           | Viral binding and cell entry                     | Inhibitory peptide                                                                       | Preclinical: in vivo Validation in a mouse model of HSV infection | US Patent 9,464,113                                                    | Deepak Shukla                        |
| Herpes                           | HSV-1 and HSV-2                                  | DECON particles                                                                          | Preclinical: in vivo                          | Nationalized in US, EP and CA                                           | Deepak Shukla, Teja Yadavalli       |
| Antibiotics discovery            | Research tool device                             | Agar-flip plate for high-throughput discovery of antibiotics                            | Preclinical: in vivo Plates fabricated and in use in research | Provisional Filed                                                        | Sang Hyun Cho, Scott Franzblau, Brian Murphy, Jeongho Lee & Rui Ma |
| Tuberculosis                     | ClpC1/P1/P2 complex                              | Rufomycin analogs with anti-tuberculosis activity                                        | Preclinical: In-vitro testing                 | US Patent Pending                                                       | Scott Franzblau                      |
| Indication                  | Target                | Therapeutic Description                                      | Stage of Development                  | Patents                                      | Faculty                                           |
|-----------------------------|-----------------------|----------------------------------------------------------------|----------------------------------------|----------------------------------------------|--------------------------------------------------|
| **TB**                      | Multiple              | Macrolides and small molecule antibiotics                     | **Preclinical:** In vitro validation  | US Patent 9,090,667                            | Scott Franzblau                                   |
| **TB and Cystic Fibrosis Pathogens** | Multiple              | Small molecule therapeutics                                   | **Preclinical: in vivo** Animal data available for best lead molecule against XDR and MDR TB | US Patent Pending                            | Alan Kozikowski, William Bishai & Laurent Kremer |
| **MRSA**                    | vraSR Operon          | Small molecule inhibitors of MRSA related OPERON.              | **Preclinical: in vitro** Cellular demonstration of technology | US Patent 9,675,592                            | Mike E Johnson, Robert Daum & Susan Boyle-Vavra  |
| **Schistosomes**            | TGR                   | Novel inhibitors of thioredoxin glutathione reductase (TGR) for the treatment of schistosomiasis | Demonstrated lethality to parasite larvae and adults | In Preparation                               | Pavel Pasha Petukhov                             |
| Indication               | Target                      | Therapeutic Description                                                                 | Stage of Development   | Patents                                | Faculty                        |
|-------------------------|-----------------------------|-----------------------------------------------------------------------------------------|------------------------|----------------------------------------|--------------------------------|
| Drug Delivery           | Non-specific                | Method to transport extracellular vesicles through tissues by water permeation           | Preclinical: Ex vivo   | US Patent Pending                      | Jae-Won Shin                   |
| Fibrosis/Osteogenesis   | Cell therapy                | Alginate coated mesenchymal stromal cell transplantation                                  | Preclinical: in vivo    | PCT Patent Pending                     | Jae-Won Shin                   |
| Drug Delivery           | Mesenchymal Stem Cells      | Method to maximize production of extracellular vesicles from mesenchymal stem cells     | Preclinical            | Provisional Filed                      | Jae-Won Shin                   |
| Herpes                  | HSV-1 and HSV-2             | DECON particles                                                                         | Preclinical: in vivo    | Nationalized in US, EP and CA          | Deepak Shukla & Teja Yadavalli |
| Drug Delivery           | Non-specific                | Toroidal-spiral design allows for two different drugs to be released at two different rates | Preclinical: in vitro  | US Patents 8,852,645 9,974,839         | Ludwig Nitsche & Ying Liu     |
| Drug Delivery           | Zwitterionic polyethylenimine (PEI), polyaziridine or polyoxazoline for protein conjugation | Polymer conjugation to increase half life and reduce renal clearance and immune response, without compromising the characteristics of the protein | Preclinical: in vitro  | US Patent Pending                      | Gang Cheng                     |
| Drug Delivery           | Non-specific                | Continuous, scalable production of polymeric particles with novel heterogenous structures for cell and gene therapy | Preclinical: in vitro  | PCT Patent Pending                     | Ying Liu                       |
| Drug Delivery           | Opioid Receptors            | Dermorphinin Analogues for the Target-Delivery of Novel Therapies for Pain and Opioid Addiction | Preclinical: In vivo   | US Patent 7,776,819                     | Jim ZaiJie Wang                |
| Drug Delivery           | Cell Therapy                | Engineered local, optogenetic lysis and permeabilization reagent for controlled drug delivery | Preclinical            | Provisional Filed                      | Chia Hao Mo                    |
| Drug Delivery           | Extracellular matrix        | In vivo bioengineered exosome to create function/target specific and content release controled exosome cargo | Preclinical: in vivo   | Nationalized in US, EP, AU and CA      | Sriram Ravindran               |
| Indication          | Target                        | Therapeutic Description                                                                 | Stage of Development                                                                 | Patents                                                                 | Faculty                        |
|---------------------|-------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------|
| Drug Delivery       | Non-specific                  | Nano-hybrid delivery system for anticancer, anti-viral and anti-angiogenic agents        | Preclinical: in vitro No animal data to date                                           | US Patent 9,168,225                                                      | Seungpyo Hong                   |
| Drug Delivery       | Dermal delivery               | Hydrogel to treat wound healing                                                          | Preclinical: in vivo Proof of concept in animals shows efficacy of repurposed FDA-approved drug to facilitate wound healing in diabetic animal model. Human clinical trial in preparation | Provisional Patent in preparation                                       | Al Mancini, Tim Koh & Paul Pluta |
| Drug Delivery       | Endothelial cells             | Myeloperoxidase-derived peptide                                                          | Preclinical: in vivo Validation of specific delivery of peptidelinked compounds into sub-endothelial spaces in mouse models | US Patent 7,429,563                                                      | Chinnaswamy Tiruppathi & Asrar Malik |
| Drug Delivery       | Neutrophils and Macrophages   | Albumin and Manoosylated-Albumin Nanoparticles for targeted drug delivery to inflammatory cells | Preclinical: in vivo Tested in MI and ARDS                                              | Large portfolio at various stages. Includes Issued Patents               | Asrar Malik                     |
# Diagnostics

| Disease/Condition | Target/Marker | Stage of Development | Patents | Faculty |
|-------------------|---------------|----------------------|---------|---------|
| Epilepsy          | Metabolite expression profile using MRI Spectroscopy | Identified in human epileptic brain tissue | US Patent Pending | Jeff Loeb |
| Pancreatic Cancer | PCR-based assay using multiple data-driven targets to create an optimized model that can predict IPMN with high-malignant potential with up to 86% accuracy | Assay run on multinational human pancreatic cancer cyst fluid | Nationalized in US, EP, CN, CA, AU and JP | Ajay Maker |
| Point-of-Care Diagnostic | In vitro data of multiple bacteria types | Novel Surface Chemistry of Filter Paper in Point-of-Care Detection/ Working prototype | Nationalized in US and EP | Yajing Song & Peter Gyarmati |
| Breast Cancer     | Estrogen receptor binding agent | In vitro development in progress | US Patent Pending | Stephen DiMagno, Gregory Thatcher, Debra Tonetti |
| Bioanalysis and Imaging/Time-resolved fluorescence | Metal chelators | Working prototype | US Patent 10,961,197 | Lawrence Miller, Ali Mohamadi |
| Metastatic cancer | Biomimetic device for capturing Circulating Tumor Cells and cancer stem cells | Validated using both human primary cancer cells and cell lines | Nationalized in US and EP | Howard Ozer |
| Cancer            | Transcriptome analytics to predict disease progression and determine personalized therapeutics | Validated in human breast cancer | US Patent Pending | Yves Lussier |
| Dry Eye Disease, Sjogren's GVHD | Histatin Biomarkers | Validated in a mouse model | Nationalized in US, JP and EP | Vinay Aakalu & Sandeep Jain |
## Diagnostics

| Disease/Condition                  | Target/Marker                                                                 | Stage of Development                                                                 | Patents                                           | Faculty                          |
|-----------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------|
| Peptide Biomarkers                | Dry eye Syndrome diagnostic and also therapeutic                              | biomarker, diagnostic, and potentially therapeutic, for ophthalmic or other system diseases especially those associated with inflammation, derangement in immunity, oncologic changes, infection, and wounding | Nationalized in US, JP and EP                     | Vinay Aakalu & Sandeep Jain     |
| Idiopathic Pulmonary Fibrosis     | Peripheral blood biomarkers                                                   | Validated in a small set of human samples                                             | US Patent 10,036,069                              | Joe Garcia                      |
| Cellular Lipids                   | In Situ Quantitative imaging with specific molecular sensors for detection from Cholesterol to Cancer | Demonstration of several in situ molecular sensors                                    | Material License                                 | Wonhwa Cho                      |
| Diagnostic imaging                | Chelating agent for use in diagnostic imaging and radioimmunotherapy         | Ongoing mouse in vivo study                                                          | Provisional Filed                                | Duncan Wardrop                  |
| Radiation-induced gastrointestinal injury | Reactive oxygen species                                                         | Validated in a mouse model                                                           | US Patent 9,643,985                              | Marcelo Bonini                  |
| Rheumatoid Arthritis              | Several Biomarkers                                                            | Patient Data from 41 year community based, case-control cohort study                  | Not Yet Filed                                    | Edward Barbour                  |
| COVID-19                          | SARS-CoV-2                                                                    | BioAerium: Airborne monitor to detect SARS-CoV-2 wild-type and mutations in airborne samples using Nucleic Acid Amplification Techniques (NAT) | Provisional Filed                                | Igor Paprotny                   |
| Disease/Condition                                      | Target                          | Target/Marker                                                                 | Stage of Development                                                      | Patents                                                                 | Faculty            |
|-------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------|
| AMD, sepsis, cancer and inflammatory disorders         | End-binding 3 protein           | IP 3R derivative peptide targeting the inhibition of EB3 to treat AMD as lead indication with additional data demonstrating therapeutic efficacy in sepsis, allergy/asthma and inflammation | **Preclinical:** Efficacy demonstrated in mouse and non-human primates models of AMD and mouse models of sepsis, allergy/asthma and inflammation | Allowed or issued patents in US and 30 countries worldwide              | Yulia Komorova     |
| Dry eye, retinopathy, angiogenesis                     | VEGF Activation                 | Fusion peptide inhibitor based on Histaminesm. Applications in wound healing, metal ion chelation, anti-inflammatory effects and angiogenesis | **Preclinical:** In vitro data, In vivo data in mouse                        | US Patent 10,800,822 Nationalized in EP, CN and JP                    | Vinay Aakalu       |
| MEK inhibitors                                         | MEK inhibitors for corneal scarring and neovascularization | Therapeutic targeting Aniridia associated with PAX6 deficiency                  | **Preclinical:** In vivo mouse data                                         | US Patent Pending     | Ali Djalilian       |
| Peptide Therapeutic                                   | Functional Pentapeptide for Treatment and Diagnosis of Human Disease | A new pentapeptide compound that enhances epithelial wound healing (multiple surfaces) and is positively associated with the histatin peptide-family to promote similar effects | **Preclinical:** In vivo mouse data                                         | PCT Patent Pending   | Vinay Aakalu       |
| DNAase                                                | Dry eye disease                 | Tear deficient dry eye disease                                                 | **Phase I/II human clinical trial:** completed                             | US Patents 9,867,871 and 10,328,129 EP, IL, ZA, CA, MX, RU, KR ad JP Patents Issued AU Patent Allowed Nationalized in BR, IN, CN | Sandeep Jain       |
| Repurposed FDA approved therapeutic                    | Dry eye disease                 | Novel Target in Eye                                                           | **Investigator initiated IND**                                             | Nationalized in US, CA, MX, EP, BR, CN and RU                         | Sandeep Jain       |
| Disease/Condition | Target | Target/Marker | Stage of Development | Patents | Faculty |
|-------------------|--------|--------------|----------------------|---------|---------|
| Tumor & Ocular Angiogenesis | Selective VEGF regulation through KAI | Peptide based inhibitor of VEGF activation | Preclinical: In vitro validation and early in vivo studies in a mouse lung cancer model | US Patent 11,299,524 | Kaori Yamada & Asrar Malik |
| Corneal Scarring, Ocular Angiogenesis | PAX 6 | MEK inhibitors can limit the corneal scarring, opacification and neovascularization in severe corneal injury and disease | Preclinical: in vivo murine model | US Patent Pending | Ali Djalilian |
| Peptide Biomarkers | Dry eye Syndrome diagnostic and also therapeutic | Biomarker, diagnostic, and potentially therapeutic, for ophthalmic or other system diseases especially those associated with inflammation, derangement in immunity, oncologic changes, infection, and wounding | Preclinical: some animal data | Nationalized in US, JP and EP | Vinay Aakalu & Sandeep Jain |
| Diabetic Retinopathy | NAMPT enzymatic activation to increase concentration of NAD in the eye. | Decrease in NAD+ levels is attributed to an imbalance between NAD+ synthesis and consumption given that the expression and activity of enzymes critical to NAD+ synthesis decline with increasing age despite the fact that the obligatory requirement for NAD+ remains high | Preclinical: Compounds have been biochemically confirmed to increase enzymatic Kcat for NAD+ production | Provisional Filed | Kiira Ratia Greg Thatcher and A. Kazlauskas |
## Ophthalmology Devices

| Device                                      | Function                                                                 | Stage of Development                  | Patents                          | Faculty                  |
|---------------------------------------------|--------------------------------------------------------------------------|---------------------------------------|----------------------------------|--------------------------|
| Corneal Blindness                          | Medical Device                                                           | Prototype                             | Nationalized in US and EP        | Mark Rosenblatt, Charles Yu |
| Ophthalmology                              | Intra-vitreal injections                                                 | Prototype; animal data                | PCT Patent Pending               | Yannek Leiderman          |
| AI Classification of Diseases              | Artificial intelligence classification methodology to differentiate between normal and diseased states of ocular conditions | AI model developed from clinical data | Nationalized in US and EP        | Xincheng Yao              |
| Non-contact non-mydriatic fundus camera Ultra wide angle | By freeing the pupil for collecting imaging light only, trans-pars-planar illumination enables >200ofundus view in single-shot images | Prototype; human data                | Nationalized in US, CN and EP    | Xincheng Yao              |
| Multimodal OCT for concurrent imaging of retinal neural activity and vascular hemodynamics | Fosters the study of neurovascular coupling mechanisms in the retina, providing a new method for retinal disease detection and diagnosis. | Prototype; human data                | US Patent Pending               | Xincheng Yao              |
| Novel Keratoprotheses                      | Sutureless Keratoprosthesis with flexible component for treatment of corneal blindness | Prototypes; rabbit data               | Nationalized in US, EP, IN and SG | Mark Rosenblatt, Charles Yu |
| Miniaturized indirect ophthalmoscopy        | Miniaturized indirect ophthalmoscopy for wide-field fundus photography. | Prototype; human data                | Nationalized in US, CN and EP    | Xincheng Yao              |
# Ophthalmology Devices

| Device                                      | Function                                                                 | Stage of Development                        | Patents                     | Faculty        |
|---------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------|-----------------------------|----------------|
| Optical coherence tomography angiography    | OCT feature analysis guided artery-vein differentiation in OCTA           | Al model developed from clinical data       | Nationalized in US and EP   | Xincheng Yao   |
| Microsurgery OCT guidance                   | Optical Coherence Tomography Image-Guided Microsurgery of the Eye        | Prototype                                   | Nationalized in US, EP and AU | Yannek Leiderman |
| Transcorneal Telescope                      | Visual aid for vision impairment due to eye diseases                     | Prototype                                   | US Patent 8,506,626          | Jose de la Cruz |
| Contrast Sensitivity Chart                  | Diagnostic tool for assessing contrast sensitivity in a subject         | Final product                               | US Patent Pending           | Jason McAnany  |
## Medical Devices

| Device                          | Function                                                                                                                                                                                                 | Stage of Development                                                                 | Patents               | Faculty                      |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------|------------------------------|
| Catheters                       | Catheter head design for use in the suprachoroidal space                                                                                                                                                  | The complete navigational system was tested in various models to demonstrate functionality, including tip articulation, obstacle maneuvering and avoidance, and targeted delivery of a payload. | PTC Patent Pending    | Anthony Felder               |
| Stroke Rehab                    | A Soft Exoskeletal Network of Elastic, Nonlinear Torque Field Generators for Neurorehabilitation                                                                                                           | simple, customizable tool capable of providing assistive torques to patients with motor deficits | US Patent Pending     | James Patton                 |
| Operating table Patient Stabilizer | Operating table for procedures in the Trendelenburg position to reduce stress on nerves and prevent musculoskeletal injury                                                                                | Prototype                                                                           | Nationalized in US, EP and AU | Michael Young               |
| Rapid Pathogen ID               | Instrument free detection of pathogens from small blood sample                                                                                                                                         | Prototype                                                                           | Nationalized in US and EP | Peter Gyarmati               |
| Spine                           | Method and device for delivering solution to posterolateral fusion: Medicant delivery in a fenestrated rod of the posterolateral fusion fixation system                                                                 | Device build and physically tested                                                   | US Patent Pending     | Ankit Mehta & Philip Ostrov |
| Ankle Stroke Rehab Device       | Affordable at-home digital rehabilitation device for post-stroke ankle recovery.                                                                                                                                 | Prototype                                                                           | Nationalized in US, EP, CA, KR and SG | Sangeetha Madhavan          |
| Pressure-indicating material    | Medical device-related pressure injury prevention pressure-indicating material                                                                                                                                 | Prototype                                                                           | PCT Patent Pending    | Alexander Yarin & Youngkwan Song |
| Protective Mesh of Proximal Ventriculoperitoneal Shunt | Device that prevents debris from clogging the shunt tubing in Hydrocephalus patients                                                                                                                        | Early prototype exists                                                               | Provisional Filed      | Ankit Mehta                 |
| Anterior CSF Leak Cage          | Anterior cervical discectomy and fusion (ACDF) leak repair implant                                                                                                                                         | Conceptual drawings for early prototype                                               | Provisional Filed      | Ankit Mehta                 |
## Medical Devices

| Device                                           | Function                                                                 | Stage of Development                     | Patents                                      | Faculty                  |
|--------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------|----------------------------------------------|--------------------------|
| **DuraClose**                                    | Device that repairs tears/punctures in the dura mater                    | Early prototype exists                   | Provisional Filed                            | Ankit Mehta              |
| **Urine Flow Meter**                             | Automated Urineometer for ICO                                            | Prototype                                | US Patent Pending                            | Michael Young etc        |
| **Extendable Intravenous Catheter**              | A catheter designed for pediatric patients                              | Prototype being developed                | US Patent 9,517,324                           | Girish Desphande         |
| **Catheter tubing**                              | Biocompatible, non-biodegradable and antifouling polyurethane            | In vitro/early in-vivo                   | Nationalized in US, EP and CN                | Gang Cheng               |
| **Type I Diabetes**                              | Novel islet transport                                                    | Mathematical Model                       | Algorithm                                    | Jose Oberholzer          |
| **Jaw-Thrust and Immobilization Device**         | A device to open and maintain an airway in an unconscious patient without any continuous attention | Tested using a human patient simulator in an obstructed airway state | US Patent 9,125,745 | Girish Desphande |
| **Endotracheal tube**                            | A two-port endotracheal tube designed to decrease the incidence of unplanned extubations with (1) a straight port used during intubation for suction tubing and introduction of other instruments (e.g., bronchoscope, in-line suction, or endotracheal tube exchanger devices) and (2) a distal (curved port) used for connecting endotracheal tube to a ventilator and sensors used for end-tidal CO2 measurement | Prototype                                | US Patent 8,991,396 | Girish Desphande |
| **Device for insertion of spinal cord stimulation paddle electrodes** | This device decreases pressure on the midline spinal structures, primarily the spinal cord, and instead main pressure points will be at the lateral aspects of the spinal canal, away from the spinal cord itself | Theoretical concept exists | US Patent 9,351,752 | Konstantin Slavin |
| Device            | Function                                                                                                                                                                                                 | Stage of Development                  | Patents                      | Faculty  |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------|----------|
| Medical Imaging   | MRI with sub-millisecond temporal resolution for cardiac valve imaging and scanner calibration (Eddy current)                                                                                           | US Patent Pending                     | Joe Zhou                    |
| Medical Imaging   | Method for Correcting Geometric Distortion in Echo-Planar Magnetic Resonance Imaging                                                                                                                     | Provisional Filed                     | Joe Zhou                    |
| Medical Imaging   | Rapid MRI with High Motion Tolerance                                                                                                                                                                      | US Patent 9,645,211                    | Joe Zhou                    |
| Medical Imaging   | Time-Efficient Phase Error Correction in EPI-PROPELLER                                                                                                                                                    | US Patent 9,612,307                    | Joe Zhou                    |
| Medical Imaging   | Method for Reducing Image Distortion in Echo Planar MRI                                                                                                                                                   | US Patent 9,797,970                    | Joe Zhou                    |
| Medical Imaging   | Tagging distance dependent $Z$-spectral (TADDZ) MRI for B0-corrected arterial spin labeling (ASL) imaging                                                                                                  | US Patent Allowed                     | Kejia Cai                   |
| Medical Imaging   | Methods for Reducing Fold-Over Artifacts in Magnetic Resonance Imaging                                                                                                                                   | US Patent 8,847,594                    | Joe Zhou                    |
| Medical Imaging   | 3D reduced Field-of-View imaging                                                                                                                                                                         | Provisional Filed                     | Joe Zhou                    |
## Software

| Title                  | Target or Indication             | Description                                                                 | Stage of Development                                                                 | Intellectual Property | Faculty                        |
|------------------------|----------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------|--------------------------------|
| Fit-N Strong           | Osteoarthritis                   | An evidence-based exercise program to treat osteoarthritis. This program is currently being taught in almost 100 sites in 24 states. | [https://www.fitandstrong.org/](https://www.fitandstrong.org/)                           | Copyright              | Susan Hughes                   |
| DEEP                   | Diabetes                         | This is a diabetes education and self-management program endorsed by CMS      | Commerically deployed [https://mwlatino.uic.edu/deep-program/](https://mwlatino.uic.edu/deep-program/) | Copyright              | Amparo Castillo                |
| My IDEA                | Drug-Eluting Stent               | My IDEA: Patient-Centered Tablet Application for Improving Medication Adherence after a Drug-Eluting Stent | Clinical trials with patients have been conducted. [https://www.frontiersin.org/articles/10.3389/fpubh.2016.00272/full](https://www.frontiersin.org/articles/10.3389/fpubh.2016.00272/full) | Copyright              | Andrew Boyd                    |
| CATCH-IT               | Adolescent depression            | Evidence based computerized cognitive behavioral therapy for depressed adolescents | Clinical trials with patients have been conducted. [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6290998/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6290998/) | Copyright              | Benjamin Van Voorhees          |
| LUPUS- PRO             | SLE Lupus                        | Patient Reported Outcomes Questionnaire                                     | Used by pharmaceutical and clinical units to gauge disease severity [http://www.lupuspro.com/information.html](http://www.lupuspro.com/information.html) | Copyright              | Alan Simon Pickard Meenakshi Jolly |
| Medicinal Cannabis     | Medical Marijuana/Cannabis        | Laboratory protocols describing the processing of medical cannabinoid products | Turn-key validated protocols                                                        | Copyright              | Jennifer Bash                  |
| Technical Manuals      |                                  |                                                                             |                                                                                      |                        |                                |
| LEAD Experience        | Legislative Education & Advocacy Development | Interdisciplinary software (learning module) designed to teach health policy to medical students | 2 week program that has already been rolled out in some states | Copyright              | James Ronayne                  |
| Academic Detailing     | Opioid Death Prevention Counselling | Academic Detailing: a comprehensive and novel method of educational outreach designed to arm providers with current evidenced-based information through individual face to face interactions between PharmD professionals and patients. | Available for Licensing from UIC                                                      | Copyright              | Simon Pickard and Todd Lee      |
## Rare Diseases

| Title | Target or Indication | Description | Stage of Development | Intellectual Property | Faculty |
|-------|----------------------|-------------|----------------------|-----------------------|----------|
| Charcot Marie Tooth (CMT) | HDAC6 | Nanomolar inhibitors of HDAC6 highly selective over other HDACs | **Preclinical: in vivo** Compounds were dosed into transgenic models of CMT and successfully blunted the disease in a transgenic animal model | US Patents 10,456,394 and 9,409,858 JP Patent Issued Nationalized in CA and EP | Alan Kozikowski |
| Niemann-Pick | Autophagy | Autophagy modulation with small molecules as a therapeutic strategy for neurodegenerative diseases | **Preclinical: in vitro** | In preparation | Leslie Aldrich |
| Niemann-Pick | TMEM 97 or NPC 1 | Small peptide (5 AA) | **Preclinical: in vivo assays** | PCT Patent Pending | Vinay Aakalu |
| Eosinophilic Esophagitis | CCR3, eosinophils | Peptide therapeutic to compete against Eotaxin and other chemokines as a treatment for asthma | **Preclinical: In vivo** Experiments in eosinophil mouse model | US Patent 10,363,286 and 11,167,012 EP Patent Issued Nationalized in CA | Steven Ackerman & Vadim Gaponenko |
| Oncology | Initial data in metastatic breast cancer, as well as colon, liver, lung, prostate, and skin cancer | Engineered HSV oncolytic virus for cancer immunotherapy | **Preclinical: in vivo** Preliminary data confirmed in mouse models | Nationalized in US, EP, AU, CN, SK, JP and IN | Bin He |
| Anti-Cancer Drug Platform With Potential as a Mono or Combo Therapy | AD5/35.IR-E1A/MADD is a new capsid-modified Ad5 vector developed to specifically target tumor cells following intravenous or intratumoral application with a reduced immune response. MADD up-regulation in cancer, its role in regulating apoptosis, and the combination of MADD knockdown with chemotherapy drugs Potential systemic delivery | **Preclinical: in vitro** Tested in certain cancer cell lines (leukemia, pancreatic, breast, liver, lung and ovarian cancer cell lines). The combination can overcome resistance and reduce the dose of chemotherapy agents | US Patents 11,273,172 and 7,910,723 | Bellur Prabhakar, Shikla Saini & Aditi Mathur |
| Oncology & Proteus Syndrome | AKT E17K mutant | Akt E17K mutant-specific inhibitor | **Preclinical: In vitro** | In preparation | Won Hwa Cho |
| Amyotrophic Lateral Sclerosis (ALS) | Neuregulin Signaling | GlyB4 Fusion with Neuregulin Heparin-Targeting Domain to Block Neuregulin Signaling | **Preclinical: in vivo** Improves early chronic motor performance deficits, delays disease onset and prolongs survival in an ALS mouse model | US Patent 7,527,794 US Patent 7,994,123 EP Patent 1,824,879 | Jeff Loeb |
| Title                                      | Target or Indication                                                                 | Description                                                                                                                                                                                                 | Stage of Development       | Intellectual Property                              | Faculty               |
|-------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------|-----------------------|
| Parkinson’s, Other Synucleinopathies      | Protein Kinase C mu or Src-Family Tyrosine Kinase                                     | Utilized a demonstrator compound as inhibitors of protein kinase C mu and src family tyrosine kinase                                                                                                | Preclinical: in vitro     | US Patent 8,618,063                                | Scott Brady           |
| Hematopoietic stem cell transplantation    | Multi-Chimeric Cells (MCC)                                                          | Multi-Chimeric Cell (MCC) Therapy for Transplantation and Treatment of Immune Deficiencies and Genetic Disorders                                                                                           | Pre-IND                   | Nationalized in US, EP, AU, CN, JP and CA          | Maria Siemionow       |
| Hematopoietic stem cell transplantation    | GABA receptor                                                                        | Repurposed drug/ GABBR1 agonist to improve HSC transplantation efficiency                                                                                                                                  | Preclinical: in vivo      | US Patent Pending                                  | Owen James Tamplin    |
| Thrombosis, sepsis                        | Von Willebrand factor                                                               | 6-mer Inhibitory peptide                                                                                                                                                                                   | Preclinical: in vivo      | US Patent 9,796,757                                | Richard Minshall      |
| Acute Respiratory Distress Syndrome / Vascular leakage | End Binding Protein (EB3) inhibitors                                                | 6AA Inhibitory peptide                                                                                                                                                                                     | Preclinical: in vivo      | Provisional Patent Filed                            | Yulia Komarova        |
| Thrombosis, blood disorders, cancer       | Platelet Adhesion Receptor Inhibitors                                               | Inhibitory peptides of the interaction between 14-3-3 Protein and Glycoprotein Ib-IX Complex                                                                                                                  | Preclinical: in vivo      | US Patents 8,173,595 and 10,738,080               | Xiaoping Du           |
| Pulmonary Arterial Hypertension           | Visfatin/Pbe/Pamnt inhibition                                                        | Small molecule Inhibitors                                                                                                                                                                                   | Preclinical: in vitro     | US Patent Pending                                  | Tom Driver            |
| Pulmonary Arterial Hypertension           | Nrf2-KEAP                                                                            | Small molecules impacting Nrf2-KEAP interaction                                                                                                                                                             | Preclinical: in vitro     | US Patent Allowed                                  | Terry Moore           |
| Lung Injury                               | Variable: Currently tested in TGFβ and SYK signaling                                | Drug loaded mannosylated albumin nanoparticles targeting distinct inflammatory and tissue-resident interstitial cells.                                                                                      | Preclinical: in vivo      | Provisional Filed                                  | Asrar Malik           |
| Company                      | Technology                                                                 | Website                                                                 | Type                  | Faculty                          | Stage of Development                                                                 |
|------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------|----------------------------------|--------------------------------------------------------------------------------------|
| 5by5                         | Novel Surgical Stations                                                   |                                                                        | Device                | Pier Giulianotti                | Seed stage startup                                                                   |
| Actuate Therapeutics         | Highly Selective GSK3 inhibitors for Oncology and CNS indications          | https://actuatetherapeutics.com                                        | Therapeutic           | Alan Kozikowski                 | Received $90M in investment; undergoing Phase II clinical trials, several indications |
| Advaite                      | Anti-inflammatory in ocular surface diseases                              | http://advaite.com/                                                   | Therapeutic           | Sandeep Jain                    | Seed stage startup                                                                   |
| Bright Minds Biosciences     | Novel biased agonists of the human 5HT2c receptor targeting multiple CNS indications | https://brightmindsbio.com/                                           | Therapeutic           | Alan Kozikowski                 | Post IPO company raised $20M, starting Phase I clinical trial in May 2022            |
| Capio Biosciences            | Circulating tumor cell capture device for diagnostic applications. Successfully raised $2M in start up funding. | http://www.capiobiosciences.com/                                      | Diagnostic            | Seungpyo Hong                   | Post IPO company raised $20M, starting a Phase I clinical trial in May 2022        |
| Cell Biologics               | Therapeutics for treating sepsis and other pulmonary indications; primary cultured cells and cell culture products | http://www.cellbiologics.com                                          | Therapeutic & Reagents | Asrar Malik                     | Seed stage company with multiple STTR grants over $1.8M                            |
| Drax Therapeutics            | Biotechnology company developing small molecule inhibitors of NAMPT as disease modifying therapeutics for Pulmonary Arterial Hypertension. | https://research.impact.iu.edu/our-strengths/innovation-commercialization/ico-pipeline.html | Therapeutic           | Tom Driver and Roberto Machado  | STTR based, preclinical assets                                                       |
| DuPage Medical               | Peptide targeting Gα13 that has dual anti-thrombotic and anti-inflammatory effects that eliminate the risk of bleeding associated with current anti-thrombotic therapies |                                                                        | Therapeutic           | Xiaoping Du                     | Seed stage company with multiple non-dilutive grants including VITA and SBIR grants totaling over $6M |
| Dystrogen Therapeutics       | Chimeric Cell Therapy for Treating Muscular Dystrophy including Duchenne Muscular Dystrophy (DMD) | http://dystrogen.com/                                                | Therapeutic           | Maria Seimionow                 | 1st in-human trial                                                                  |
| Enzyme by Design             | Safer asparaginase proteins that have been designed to minimize glutaminase activity for treating cancer | https://www.enzymebydesign.com                                       | Therapeutic           | Arnon Lavie                     | Seed stage corporation with multiple STTR grants over $4M                            |
## Startups

| Company                  | Technology                                                                 | Website                                      | Type       | Faculty                          | Stage of Development                                                                 |
|--------------------------|---------------------------------------------------------------------------|----------------------------------------------|------------|----------------------------------|--------------------------------------------------------------------------------------|
| EpiDestiny               | Decitabine formulation for treating blood related cancers and indications including sickle cell anemia | [https://www.epidestiny.com](https://www.epidestiny.com) | Therapeutic | Yogen Saunthararajah & Joe DeSimone | Partnered with Novo Nordisk for Sickle cell disease programme (Phase I completed), Phase II clinical trials initiated for myeloid malignancies, peripheral T-cell leukemias/lymphoma, and small cell lung cancer (seeking partnership). |
| FertilityABC             | Software (app) for primary care physicians, their patients, and Resident physicians to provide guidance on methods besides in vitro fertilization to increase opportunity/likelihood for pregnancy |                                               | Software Application | John Holden                      | App beta testing ongoing                                                              |
| Keywise Inc.             | A smartphone application that enables monitoring of non-verbal speech using keyboard dynamics, meta-data, and related mobile sensor information to infer the users’ neuropsychological state | [https://keywise.tech/](https://keywise.tech/) | Heath IT Software | Alex Leow Olusola Ajilore Faraz Hussain | App beta testing ongoing                                                              |
| Nano Biotherapeutics Inc.| Diagnosing or Treating Neutrophil-Mediated Inflammatory Disease          | [http://www.nanobiotherapeutics.com](http://www.nanobiotherapeutics.com) | Therapeutic | Asrar Malik                      | Seed stage company with multiple STTR grants over $1.7M                               |
| NS Intelligence IP       | Non-contact videoplethysmograph (VPG) measure of human arterial pulse using a digital camera |                                               | Diagnostic | Stephen Porges                  |                                                                                       |
| PAX Neuroscience         | Blood based test for evaluating antidepressant efficacy and diagnosing depression | [http://www.paxneuroscience.com](http://www.paxneuroscience.com) | Diagnostic | Mark Rasenick                   | Preseed company, working in depression diagnostics                                   |
| RespireRX                | Novel drug therapies for sleep apnea, drug-induced respiratory depression, and other brain-mediated breathing disorders | [http://www.respirerx.com](http://www.respirerx.com) | Therapeutic | David Carley                    | RespireRx Pharmaceuticals has raised a total of $12.2M in funding over 5 rounds.     |
| Company                 | Technology                                                                 | Website                                      | Type                        | Faculty                          | Stage of Development                                                                 |
|------------------------|-----------------------------------------------------------------------------|----------------------------------------------|-----------------------------|----------------------------------|--------------------------------------------------------------------------------------|
| Revivo Therapeutics    | Novel methylthiazoles for CNS indications with the lead molecule well tolerated in a Phase 1 study in healthy volunteers | [http://www.revivotherapeutics.com](http://www.revivotherapeutics.com) | Therapeutic                 | Greg Thatcher                     | Seed stage company with $3M in funding, seeking further venture funds                |
| Selagine               | Antibody based biologics for eye diseases                                   | [https://www.selagine.com/](https://www.selagine.com/) | Therapeutic                 | Sandeep Jain                     | Seed stage startup                                                                  |
| SENEX Bio              | Biotechnology company pivoting on development of novel kinase inhibitors for oncology, Senex is developing highly selective small-molecule inhibitors of this protein for the treatment of presently incurable types of prostate cancer, breast cancer and leukemia | [https://senexbio.com/](https://senexbio.com/) | Therapeutic                 | Igor Roninson and Karthik Gopalakrishnan | Company is repivoting on a new platform and raising seed stage investment            |
| Syntax                 | Biotech developing a proprietary CRISPR/Cas9 based, genetic programming platform technology that converts cells into biological computers using DNA based instructions that read like lines of code company leveraging next generation CRISPR in therapeutics and food science. |                                      | Therapeutic & Food Science | Brad Merrill and Ryan Clarke       | Supported by Portal Innovations, raising seed $5M                                      |
| Tianhe Stem Cell Biotechnologies | Stem Cell Educator Therapy is a treatment of autoimmune related diseases using stem cells drawn from human umbilical-cord blood | [http://www.tianhecell.com](http://www.tianhecell.com) | Device & Therapeutic        | Yong Zhao                        | Phase 2 clinical trial initiated for Type 1 Diabetes, Alopecia Areata, and Covid 19 |
| TTC Oncology           | Clinical stage hormone receptor modulators for treating cancer              | [https://www.ttconcology.com](https://www.ttconcology.com) | Therapeutic                 | Greg Thatcher                     | Completed Phase I trials with $5M capitalization, seeking additional funds            |
| ViSoTherapeutics       | Histatin Peptides                                                           |                                              | Therapeutic                 | Vinay Aakalu                     | Seed stage startup                                                                  |
| Yaso Biotech           | Therapeutic and prophylactic agent for sexually transmitted viral pathogens with contraceptive properties | [http://www.yasotherapeutics.com](http://www.yasotherapeutics.com) | Therapeutic                 | Alex Krunic & Don Waller          | STTR phase company with $5M raised, seeking venture capital                         |