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LAST UPDATED: 3/16/2022

	Ref#	Project Name	Description	Primary Therapeutic Area	Secondary Therapeutic Area	Technology Type	Tag(s)	Lead PI Last Name	Lead PI First Name	PI Department	Stage of Development	Commercialization Focus
Recently Added	5717	PSMA with Multiple Single-Chain and Domain Binders Treats Prostate Cancer	This innovation regarding PSMA antibodies has several unique features. Researchers used the small format of the VH-antibody domains binders, which provides the opportunity for developing ADCs with better tumor penetration compared to the full IgG, or Fab, or scFv formatted ADCs. The antibodies developed in the invention are derived from fully human phage display libraries, which provides for low risk of inducing immune response. The selection of binders competing with the antibodies J591 and VH-PSMA from TNB585 ensured targeting distinct epitopes on the PSMA surface. The affinities of the selected binders span two orders of magnitude including the affinities of the reference binders. This provided for a tuning capability of the developed antibody-based pharmaceuticals. The developed PSMA antibodies can be used for targeting PSMA expressing cells with high selectivity using either ADC, or ADCC, or CAR T cells.	Oncology		Antibody,protein,peptide	Antibody;Biologic; Immuno-oncology	Dimitrov	Dimiter	Med-Medicine	In vitro data	License
Recently Added	5716	Enzyme Inhibitor Promotes Anticancer Immune Response	Researchers at the University of Pittsburgh have identified a novel enzyme inhibitor that promotes antitumor immune response. This inhibitor blocks activity of aldehyde dehydrogenase-1A enzymes. These enzymes synthesize retinoic acid to regulate multiple cellular processes. When applied to immune cells, this enzyme inhibitor enhanced dendritic proliferation and drove T cell differentiation away from immunosuppressive regulatory T cells and towards cytotoxic T cells. Treatment of cancer cells induced immunogenic cell death. When applied in vivo along with a tumor vaccine this enzyme inhibitor significantly increased tumor control. These successes make this novel enzyme inhibitor a promising candidate for developing immunotherapies that act on aldehyde dehydrogenase-1A to treat cancers that have yet to be successfully treated with immunotherapy.	Oncology	Infectious Disease	Small molecule	Immuno-oncology; Immunotherapy, Immune activator, Vaccine	Buckanovich	Ronald	Med-Medicine	In vivo data	License
Recently Added	5700	Human Antibodies Identified as Brain Cancer Immunotherapy Targets	Researchers at the University of Pittsburgh have identified eight human antibody heavy chain variable domains that have strong immunotherapeutic potential for treating medulloblastoma. These antibodies act against the oncogenic protein, protogenin. The eight identified antibody heavy chain variable domains act against different immunoglobulin and fibronectin domains of protogenin to block protogenin affected growth of medulloblastomas. These antibodies have been applied in vitro and have been shown to reduce the growth of group 3 medulloblastomas. The strong activity of these antibodies against protogenin makes them a promising immunotherapy target for treating medulloblastoma.	Oncology		Antibody,protein,peptide	Antibody;Pediatrics;Rare disease	Dimitrov	Dimiter	Med-Medicine	In vitro data	License
Recently Added	5658	Microfluidic System Rapidly Isolates Extracellular Vesicles from Biological Fluids	Researchers at the University of Pittsburgh have developed a device and accompanying control software that isolates extracellular vesicles at specified size fractions from biological fluids within seconds. This hierarchically structured microfluidic fractionation device simultaneously isolates the entire size range of extracellular vesicles, including exosomes, microvesicles, apoptotic bodies, and large oncosomes, from any biological fluid. The device allows the user to control the size-specificity so that it can also be used to isolate large cells, such as oocytes and megakaryocytes, that are filtered out of biological fluids at the beginning of most analytical methods. The entire system is automated, has a high isolation throughput, and runs within seconds.	Other		Other	Extracellular Vesicles, Label-free Isolation, Cell Fractionation	Hajipouran Benam	Kambez	Med-Medicine	Prototype	License
	5603	Inhibition of Fgr Reduces Radiation-Induced Profibrotic Markers	Using RNA-sequence analysis with a pure population of sorted radiation-induced senescent cells, University of Pittsburgh researchers found that Fgr mRNA is upregulated by more than 70-fold exclusively in senescent cells. Previous research does not implicate Fgr in RIS-induced lung fibrosis. Pharmacologic inhibition of Fgr in senescent cells reduced profibrotic gene expression in targeted cells, heralding the potential to prevent fibrosis from developing in individuals who have sustained radiation damage.	Respiratory		Small molecule		Mukherjee	Amitava	Med-Radiation Oncology	In vitro data	License
	5579	Novel Approach to Discovering Repurposed Drugs and Compounds for Treatment against SARS-CoV-2 Infection	Rather than targeting viral proteins, Pitt researchers aim to exploit the natural antiviral programs that arm host cells and used a comprehensive, mechanism-unbiased, and highly integrated systems-level approach. A set of 38 priority candidate compounds targeting the host system, including repurposable and computational drugs, were identified using computational modeling. Fifteen compounds have potential antiviral actions, while 23 have possible anti-hyperinflammatory capabilities. Fourteen have been selected for in vitro assays with different cell lines. Several of these compounds inhibited SARS-CoV-2 infection in a dose-dependent manner, with two showing particular efficacy. These findings expand the repertoire of drugs and compounds that can be repurposed or developed for treating COVID-19 either independently or in combination with each other.	Infectious Disease		Small molecule		Schurdak	Mark	Med-Computational and Systems Biology	In vitro data	License
Recently Added	5572	MyBP - A digital tool for individuals with hypertension	MyBP is an automated program that assists patients in routine and systematic HBPM. It is designed to be flexible to a person's own weekly schedule and provide timely feedback and data tracking to facilitate understanding and continued engagement. Testing and research conducted by the University of Pittsburgh inventors using MyBP has shown high patient engagement, high value ratings by patients, improved confidence in HBPM, and intentions to improve BP-lowering, healthy behaviors (eg, diet and exercise). In patients with uncontrolled hypertension, use of MyBP appears to lower blood pressure.	Cardiovascular		Other	Digital therapeutic	Muldoon	Matthew	Med-Medicine	Proof of concept demonstrated with patients.	License
	5559	Small Molecule Allosteric Modulators of Class B GPCRs inthe PTHR and Method to Identify Them	The allosteric drugs disclosed here were designed to specifically modulate selected interactions with the PTHR upon altering its structural mechanics. This "allo-targeting" approach is being hailed in drug discovery and development for its use in designing efficacious therapies. A structure-guided computational approach was used to identify allosteric druggable sites in PTHR and to predict compounds that would bind to this site, and Pitt researchers discovered four small-molecule compounds that act as negative allosteric modulators of PTHR signaling. Further computational protocols indicated that the experimentally-identified small molecule drug candidates were predicted to bind to this site, lending more evidence to the use of this computational approach to discovering druggable sites in other class B GPCRs.	Endocrinology	Musculoskeletal	Small molecule	Bioinformatics;Small molecule	Sutkeviciute	Ieva	Med-Pharmacology and Chemical Biology	In vivo data	License
	5557	A New Peptide to Treat Glioblastoma by Modifying the Tumor Microenvironment to Enhance Antitumor Immune Response	Pitt researchers have discovered three novel immunomodulators of the TME that form protein binding complexes capable of controlling tumor-associated macrophages, which are the major components of the glioblastoma TME. This discovery enabled the design of a new peptide that interacts with the recently discovered immunomodulators to modify the TME to enhance antitumor immune response. Animal experiments revealed that this treatment produced an increase of T cell infiltration and expression of immune checkpoint inhibitors, suggesting the potential of the newly developed peptide to overcome GBM resistance to immunotherapy and synergize with immune checkpoint blockade therapy by combining with other FDA-approved drugs, such as nivolumab or pembrolizumab. This new peptide could give rise to a novel class of drug candidates, including small molecule compounds and therapeutic antibodies, for treating glioblastoma and other types of cancer.	Oncology		Antibody,protein,peptide		Hu	Baoli	Med-Neurological Surgery	In vivo data	License
Recently Added	5544	Antioxidant Therapy for Treating Propionic and Methylmalonic Acidemia	Researchers at the University of Pittsburgh have developed a new, non-invasive treatment for propionic and methylmalonic acidemia. Propionic acidemia is caused by a lack of the enzyme, propionyl-CoA carboxylase, which is key in metabolizing certain components of proteins and fatty-acid chains. Without this enzyme, reactive oxygen levels increase in cell mitochondria. This therapy is composed of mitochondria-targeted antioxidants that reduce levels of reactive oxygen in cells, thereby limiting the oxidation damage resulting from propionic and methylmalonic acidemia. By reducing reactive oxygen levels in cells, this therapy can mitigate physiological damage caused by these diseases.	Rare Diseases		Small molecule	Mitochondrial targeted antioxidants; Fatty acid oxidation; Oxidative phosphorylation; Respiratory chain; Electron transport chain	Vockley	Gerard	Med-Pediatrics	In vivo data	License
	5535	Tissue Customized Platelet-Rich Plasma for Optimized Skeletal Muscle, Cartilage, and Bone Healing	In order to make PRP therapy as effective and beneficial as possible, a Pitt researcher has developed a novel approach to customizing PRP to be tissue-specific by eliminating negative/deleterious factors for specific tissue. This tissue-customized PRP will have targeted factors eliminated by neutralizing antibodies that are conjugated using magnetic beads. This technique can easily be added to current PRP isolation protocols, leading to the development of novel approaches to optimize the use of PRP through customization and minimizing potential deleterious effects on the targeted tissue.	Orthopedics		Cell therapy	Biologic	Li	Hongshuai	Med-Orthopedic Surgery	In vitro data	License
	5526	Conditional Control of Universal CAR T Cells through Stimulus-Reactive Adaptors	The novel conditional ON-switch systems consist of adaptors with a stimulus-reactive group which serves to block the tag molecule on the adaptor. Without the stimulus, this "caging group" blocks recognition by CAR T cells; with the stimulus, the caging group is removed, allowing recognition by CAR T cells and activating the receptor. The OFF-switches consist of adaptors with a stimulus-reactive chemical cleaving group between the tag and the antibody so that when no stimulus is present the adaptor will activate the CAR T cells but, in the presence of the stimulus, the tag will be cleaved from the adaptor and halt CAR T cell activation. This method offers unprecedented levels of control over CAR T cell activation and deactivation, leading to lower toxicity, improved targeting, improved patient outcomes, and the ability to treat new disease indications.	Platform Technology		Cell therapy		Lohmueller	Jason	Med-Immunology	In vitro data	License;NewCo

Recently Added	5523	300 Novel CB1 Antagonists Hold Potential for new Treatments	Cannabinoid receptor type 1 (CB1) is a G protein-coupled cannabinoid receptor encoded by the CNR1 gene. Through a detailed process involving the synthetization and testing of hundreds of antagonists, University of Pittsburgh researchers have now completed testing of over 300 novel CB1 antagonists that are structurally distinct from all prior classes, which indicates this discovery holds vast potential for additional treatments and uses within the complex physiologic system.	Metabolic Disease	Small molecule	Small molecule	Chen	Beibei	Med-Medicine	In vitro data	License
	5521	Cytosolic Protein Quality Control Small Molecule Therapeutics	Pitt researchers developed a high-throughput optical screen for such modulators and conducted a pilot screen that successfully identified several compounds of interest. There is a wealth of interest in small molecule PQC modulators of cytosolic proteins that may serve as therapeutic drug targets for diseases characterized by cytosolic protein instability.	Rare Diseases	Small molecule	Rare disease	Palladino	Michael	Med-Pharmacology and Chemical Biology	In vitro data	License
	5520	Therapeutic Targets for TPI Deficiency	In order to identify novel factors that modulate mutant TPI turnover, University of Pittsburgh researchers performed a genome-wide RNAi screen targeting known and predicted quality control proteins. Of more than 400 proteins screened, 25 regulators of TPI were identified, ten of which were novel and previously undescribed. These ten proteins are also conserved in mice and humans, making them more likely to be effective drug targets than other more promiscuous proteins. The proteins identified by this study may reveal novel pathways and drug targets to block degradation of functional, cytosolic proteins, and represent important therapeutic targets for drug development for TPI deficiency and other devastating diseases.	Rare Diseases	Other	Rare disease	Palladino	Michael	Med-Pharmacology and Chemical Biology	In vivo data	License
	5496	Driving Oxidative Metabolism in Therapeutic T Cells through Overexpression of AMPK	Cultured T cells that are capable of performing oxidative metabolism are more fit for the metabolic conditions they will encounter in vivo, and promoting oxidative metabolism has been shown to increase their in vivo persistence. Oxidative metabolism is also inversely correlated with how differentiated a cell becomes, and a major goal has been to make effector cells both less differentiated and more oxidative before transfer into recipients.Increasing the cellular energy sensor AMP-activated protein kinase (AMPK) is expected to increase the oxidative metabolism of a T cell, leading to an increase in both its stability and suppressive capabilities. By overexpressing the regulatory component of the AMPK heterotrimeric complex via lentiviral transduction of primary human T cells, Pitt researchers propose to modulate AMPK activity and thereby improve the efficacy of multiple therapeutic interventions dependent upon T cells.	Oncology	Cell therapy		Byersdorfer	Craig	Med-Pediatrics	In vitro data	License
	5491	Odansetron for Treatment of Acute Kidney Injury	Using electronic medical records (EMR) from more than twenty thousand AKI patients in ICU stays, researchers identified a novel indication for odansetron, an antiemetic drugused to prevent nausea caused by chemotherapy, in preventing deathof patients with AKI. The molecular mechanism of odansetron suggests that it can down-regulate AKI-related genes. Odansetron's beneficial effects on recovery from acute injury have never been reported before.	Critical Care	Small molecule		Wang	LiRong	Pharm-Pharmaceutical Science	Retrospective clinical data	License
	5450	RNF167 and CASTOR1 as Novel mTOR Targets	Low CASTOR1 expression is a poor prognosis marker for ten types of cancer, while high expression of the RNF167, a ligase that targets CASTOR1 for degradation, has been identified as a poor prognosis marker for five types of cancer. Researchers also demonstrated that AKT and RNF167-mediated CASTOR1 degradation activates mTORC1 and promotes breast cancer progression. AKT-mediated phosphorylation of CASTOR1 significantly increases its binding to RNF167, revealing a novel mTORC1 regulating mechanism and potential new therapeutic targets for mTORC1-dysregulated diseases.	Oncology	Small molecule		Gao	Shou-Jiang	Med-Microbiology and Molecular Genetics	In vitro data	License
	5448	Stimulation of Angiogenesis with miRNA as Protection Against Acute Kidney Injury	One of the hallmarks of AKI is damage to renal microvasculature, which alters endothelial function and contributes to hypoxic and inflammatory injury to the renal parenchyma. In AKI, some miRNAs appear to act pathogenically by promoting inflammation, apoptosis, and fibrosis, while others may confer protective benefits. Researchers have obtained preliminary data indicating that the absence of the miR-17~92 cluster makes cells are more susceptible to renal ischemia-reperfusion injury while miR-18a and miR-19b protects against renal IRI, providing evidence for a potential novel therapeutic approach for the treatment of acute kidney injury.	Nephrology	Other		Lucas	Sunder	Med-Pediatrics	In vivo data in mice using mimics	License
	5404	Insertion Unique to SARS-CoV-2 Exhibits Superantigenic Characteristics	Using structure-based computational models, researchers have demonstrated that the SARS-CoV-2 spike harbors a sequence motif unique to SARS-CoV-2 and not present in other SARS coronaviruses, which is highly similar in both sequence and structure to bacterial superantigens. Further examination suggested that the SARS-CoV-2 spike may act as a superantigen that drives the development of MIS-C as well as the cytokine storm in adult COVID-19 patients. Potential development strategies include preparing a decoy peptide that can bind to the site in the viral structure and prevent it from binding to T cell receptors or preparing a monoclonal antibody specific to the viral superantigenic binding site and thus block the interaction with the T cell receptor.	Infectious Disease	Antibody,protein,peptide		Bahar	Ivet	Med-Computational and Systems Biology	Design; candidate antibodies identified	License
	5390	Small Molecule Inhibitor Therapy to Prevent Aneurysm Formation, Growth, and Rupture	New research shows that small molecule inhibitors targeting the platelet-driven CXCL7-CXCR1/2 inflammatory pathway can be used to prevent cerebral aneurysm formation and rupture. This approach may be able to be used to develop a pharmacological treatment of unruptured and coiled aneurysms, enabling a superior healing response and avoiding the risks inherent in open surgery.	Neuroscience	Small molecule	Small molecule	Friedlander	Robert	Med-Neurological Surgery	In vivo data, including cytokine arrays and ELISA data from a hypertensive mouse model of intracranial aneurysm formation; electron microscopy of aneurysm samples, cytokine arrays of aneurysm samples, and blood samples from human patients with aneurysms, and in silico computational data for pathway discovery from the above cytokine arrays.	License
	5372	HDAC Inhibitors as Anticancer Agents	University of Pittsburgh researchers have developed a series of chromane-based hydroxamic acids that have been demonstrated to be potent and selective HDAC inhibitors with potential use as novel anticancer and anti-neurodegenerative agents.	Central Nervous System	Small molecule		Wipf	Peter	Chemistry	In vitro data	License
	5348	Prodrug-Based Amphiphilic Polymer for Cancer Treatment	Researchers have developed a prodrug-based amphiphilic polymer (PASA) with COX inhibiting pharmacological properties. PASA self-assembles to forma small-sized nanocarrier that is highly effective in loading doxorubicin (DOX) and capable of codelivery of both the COX inhibitor and chemotherapeutic agent together. PASA has an unprecedentedly high DOX loading capacity and has been shown to be highly effective in targeting to and inhibiting the growth of murine tumors and successfully achieves COX inhibition at much lower concentrations. Moreover, combination of PASA/DOX with anti-PD-1 antibody leads to drastic improvement, including complete regression of some established tumors, even at suboptimal doses of PASA/DOX. This has the potential to represent a new and effective immunochemotherapy for various types of cancer.	Oncology	Drug delivery	Drug delivery	Li	Song	Pharm-Pharmaceutical Science	In vivo data	License
	5326	SARS-CoV-2 Recombinant Adenovector Vaccine	The spike (S) protein on the envelope of SARS-CoV-2 and other coronaviruses has been identified as a mediator of viral entry into a host cell, and it has been demonstrated that antibodies targeting the S protein can block the binding of these viruses to the cell receptor. Further, targeting the S1 subunit of the S protein generates a more efficacious neutralizing antibody response than targeting the full-length S protein in addition to reducing the potential risk of antibody-dependent enhancement observed with some vaccine candidates that targeted the entire S protein. Pitt researchers have constructed and evaluated a recombinant adenoviral vector encoding the transgene for the antigen SARS-CoV-2 S1 for COVID-19 which elicits a potent and specific IgG antibody response as early as two weeks after vaccination. They have also discovered that intranasal vaccine delivery generates significantly higher antigen-specific IgG levels and neutralizing activity compared to subcutaneous vaccine injection. This new adenovirus vaccine and its associated intranasal delivery mechanism display promising immunogenicity, making it an appealing candidate against this and other emerging coronavirus diseases.	Vaccines	Vaccine		Gambotto	Andrea	Med-Surgery	In vivo data	License
	5317	A Novel Neoplastic Fusion Transcript Predicts Sensitivity to the MEK Inhibitor Trametinib in More Aggressive and Metastatic Breast Cancers	Researchers at University of Pittsburgh have discovered a non-traditional molecular event underlying molecular pathobiology of more aggressive and metastatic breast cancer. In this study, a large-scale analysis of breast cancer transcriptome revealed a tumor-specific fusion transcript that is preferentially overexpressed in luminal B and metastatic breast cancers and has been shown to increase aggressiveness of luminal breast cancer cells. This fusion also appears to activate a chain of signaling proteins that play a critical role for cancer cell to disseminate and colonize distant organs. To date, this fusion remains the most frequently expressed tumor-specific fusion transcript reported in luminal breast tumors. Importantly, breast cancer cells overexpressing this fusion transcript show markedly increased sensitivity to trametinib, the first FDA approved oral MEK inhibitor used for treating melanoma. This discovery suggests a new paradigm that non-traditional molecular events may be accountable for more aggressive and metastatic breast cancers and are a promising target for treating these deadly tumors.	Oncology	Antibody,protein,peptide		Wang	Xiaosong	Med-Pathology	In vitro data	License

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	5298	ImmunoPET Imaging of CD107a	A promising option to improve diagnostic imaging is immunoPET, which combines the high sensitivity and quantitative capabilities of positron emission tomography (PET) with the specificity and selectivity of monoclonal antibodies (mAb) against a given tumor cell surface marker. Targeting the cell surface marker CD107a, a marker of CD8+ T-cell degranulation and natural killer (NK) cell functional activity,with immunoPET probes can quantify the extent of T-cell mediated cytotoxic action, which directly correlates to immunotherapy.This technique serves as a novel diagnostic, a means of measuring immunotherapeutic response to treatment, and a non-invasive therapy. ImmunoPET imaging with CD107a mAbs represents a move away from a one-medicine-fits-all trial-and-error approach to treating cancer to offering the right treatment, for the right patient, at the right time, providing a more targeted, personalized, and efficient therapy.	Oncology		Molecular diagnostic		Edwards	Wilson	Med-Radiology	In vivo data	License
	5290	Profilin1-actin interaction inhibitor as a Novel Anti-Angiogenic Compound	Profilin1-actin interaction is critical for actin-driven biological processes; specifically, angiogenesis, which drives ccRCC in addition to other pathologies including proliferative diabetic retinopathy, wet age-related macular degeneration, and other types of cancer. Targeting Profilin1 instead of VEGF is an alternative strategy to treating these diseases without developing the spontaneous or acquired resistance seen in anti-VEGF approaches. Proof-of-concept studies have demonstrated that inhibiting the Profilin1-actin interaction reduces proliferation and migration of RCC tumor cells and may also prove useful as a prognostic biomarker.	Platform Technology		Small molecule		Roy	Partha	Bioengineering	In vivo data; SAR studies of commercially available structural analogs underway	License
	5288	A New Therapeutic and Diagnostic Target for SARS-CoV-2 and COVID-19	Prior research in a University of Pittsburgh laboratory had focused on investigating the pathobiology of endothelial cell nuclear receptor coactivator 7 (NCOA7). NCOA7 has been shown to regulate immunoactivation of the endothelium and subsequent leukocyte adhesion, leading to presumable viral infiltration. NCOA7 accomplishes this by altering lysosomal acidification, a process that has been independently found to affect entry of other enveloped viruses such as the similarly-structured influenza virus. Researchers have also identified an allele-specific mechanism that may influence NCOA7 expression and cellular susceptibility to infection. This invention includes the development of small molecules, gene therapy systems, RNAi-based systems, or the use of certain inhibitors to control NCOA7 expression to prevent or improve infection in addition to the use of NCOA7 SNP genotyping as a means of individual risk of infection and disease severity in order to prevent infection or complications. NCOA7 may prove to be immediately relevant for development of new drugs and repurposing of old drugs for therapies for this new pandemic.	Infectious Disease		Other		Chan	Stephen	Med-Medicine	In vitro testing of predicted compounds in cultured human cells	License
	5259	Human Monoclonal Antibodies against SARS-CoV-2	Pitt researchers have developed neutralizing human mAbs that specifically target the SARS-CoV-2 RBD using large phage displayed antibody libraries for use in preventing and treating SARS-CoV-2. Two high-affinity binders neutralized the virus by competing with ACE2 for binding with the receptor. One other high-affinity binder did not compete significantly with ACE2, but could induce antibody-dependent cellular cytotoxicity (ADCC), killing infected cells. To our knowledge, these were the first human mAbs that can bind to the RBD and neutralize the virus.	Infectious Disease		Antibody,protein,peptide	Antibody	Dimitrov	Dimiter	Med-Medicine	In vitro data	License
	5236	Substituted Indoles with Activity to Treat Acute Kidney Injury	Using a proliferation-based phenotypic assay in zebrafish, researchers have discovered a class of compounds which selectively inhibit HDAC and enhances recovery from acute kidney injury when given days after the initial injury.	Nephrology		Small molecule		Huryn	Donna	Pharm-Pharmaceutical Science	In vivo data in zebrafish	License
	5224	RNA-and DNA-Based Assays for Predicting Paclitaxel Resistance in Triple Negative Breast Cancer	While the complexity of genomic rearrangements in this cancer has obscured the role that gene fusions play in the pathology of TNBC, researchers at the University of Pittsburgh identified 99 recurrent gene fusions, 57% of which are cryptic adjacent gene rearrangements (AGRs). The most frequently occurring AGRs were preferentially found in the more aggressive forms of breast cancers that lacked well-defined genetic targets; one was found exclusively in TNBC and TNBC tumors with this fusion gene exhibited aggressive histopathological features such as gross necrosis and high tumor grade. This fusion gene was also shown to endow resistance to paclitaxel treatment. RNA- and DNA-based assays for this gene fusion can be used to predict paclitaxel resistance in triple negative breast cancer and allow treatment providers to quickly pivot to alternative treatment options, sparing the patient from the unnecessary and unpleasant side effects of chemotherapy, in addition to serving as a target for novel therapeutics.	Oncology		Other diagnostic		Wang	Xiaosong	Med-Pathology	In vitro data	License
Recently Added	5214	Cationic Peptides for Treatment of Drug-Resistant Cancer and Infections	Peptide studies to date are incremental and tailored to a single best peptide. With this new technology, researchers designed a rational framework for engineering a class of cationic peptides with the property to overcome MDR bacteria-related infections. This means the invention can yield dozens of therapeutics, which display in vivo efficacy. The technology transcends the discovery of a particular drug and encompasses a class of compounds that is iterative.	Infectious Disease	Oncology	Antibody,protein,peptide	Biologic;Peptide	Deslouches	Berthony	GSPH-Environmental/Occupational Health	In vitro data	License
	5144	Software for De-Identifying Medical Narrative Documents	De-ID is just such a system; inputting an ascii file containing free-text medical reportsyieldsa file that contains a de-identified version of the report. De-ID is used at the University of Pittsburgh and other research universities across the country to remove identifying information such as patient name, address, or relevant dates. Recent additions to the software have improved functionality by allowing for batch processing of files, allowing the program to be called by another, and improved heuristics for finding and removing the protected health information. Additional user-controlled features, such as customizing the amount, direction, and units of date offset, have improved usability for researchers. De-ID represents a simple, effective way to anonymize enormous sets of patient data, guarantee HIPAA compliance, and protect patients' privacy.	Other				Saul	Melissa	Med-Medicine	Software	License;NewCo
	5099	Trabecular Meshwork Stem Cell Secretome for Treatment of Glaucoma	The secretome derived from trabecular meshwork stem cells (TMSCs) has been found to reduce IOP in two glaucoma mouse models of steroid-induced and inherited glaucoma. Treatment with secretomeby periocular injectionleadsto dramatic IOP reduction to a normal range for up to two months,as well as improved retina function similar to normal animals. Secretome reduced fibrosis in wounded TM cells, increased TM cells'wound healing capacity, and protected retinal ganglion cell from death. The safety evaluation did not indicate any side effects with secretome treatment.	Ophthalmology		Cell therapy		Du	Yiqin	Med-Ophthalmology	In vitro and in vivo data; xenograft experiments have been completed with very promising results	License
	5084	Lung-Targeting Peptide to Deliver Diagnostic and Therapeutic Targets to the Lung	Building on previously synthesized cell-penetrating peptides, researchers at the University of Pittsburgh developed two new peptidesthat displayed up to five timesgreater transduction activity compared to its predecessorsin vitro. Interestingly, thesepeptides showrobust uptake in lung tissue and epithelial cells lining the alveoli far in excess of the heart—the expected target—and in excess of any uptake of the original peptide. Delivered via injection, thesecell-penetrating peptides havepreviouslydemonstrated their capacity to act as vectors for delivery of genes, siRNA, anti-sense oligonucleotides, peptides, proteins, nanoparticles, viral particles, and radioisotopes. These novel synthetic peptides presenta wealth of new opportunities for drug delivery to thelungs via peripheral injection, sidestepping the mechanical and immunological barriers that have thus far prevented efficient pulmonary drug administration.	Respiratory	Platform Technology	Drug delivery		Zahid	Maliha	Med-Developmental Biology	In vivo data using a chemical model of COPD	License
	5075	Upregulation of NMDA Receptor Function by a GluN2A/ZnT1-directed Peptide	Researchers designed a cell and blood-brain-barrier permeable peptide termed TAT-N2AZ aimed at disrupting the ZnT1-GluN2A interaction. They observed that in the presence of the peptide, but not a control scramble, NMDA receptor activation was enhanced by decreasing the inhibitory actions of synaptically-released zinc. This is the first tool developed to enhance NMDA receptor function via a previous undescribed mechanism and may be useful in the treatment of disorders associated with NMDA receptor hypofunction,such as schizophrenia.	Neuroscience		Antibody,protein,peptide		Aizenman	Elias	Med-Neurobiology	In vitro data	License
	5071	Oncolytic Vaccinia Virus Delivering Tethered IL-12 Enhances Antitumor Effects with Improved Safety	Pitt researchers constructed an oncolytic vaccinia virus that encodes membrane-tethered IL-12 and tested if it could turn a cold tumor into hot tumor while avoiding the systemic toxicity of IL-12. Virus-delivered IL-12 was shown to have greatly reduced toxicity, while retaining its potent capability of eliciting an antitumor immune response. The treatment facilitated the transformation of a cold tumor to a hot tumor and improved survival. Combined with PD-1 blockade, it induced potent antitumor effects in multiple tumor models. Impressive trials in mice suggest immediate translatability to clinical settings.	Oncology		Drug delivery	Immuno-oncology	Bartlett	David	Med-Surgery	In vivo data	License
	5061	Peripheral Nerve Agonists to Suppress Inflammation	Based on a discovery that neurons that promote painful sensations and also drive inflammation in the skin, researchers at the University of Pittsburgh determined that a specific subset of neurons that innervate the epidermis as well as the intestine are required to suppress the activation of inflammation-causing mast cells. This unique group of neurons express a protein which, when treated with its corresponding small-molecule agonist, suppresses cutaneous mast cell function. This discovery indicates that small-molecule agonists of this neuron type could be used to suppress mast cell activation without inducing global immune suppression, fulfilling an as-yet unmet therapeutic need.	Other		Small molecule		Kaplan	Daniel	Med-Dermatology	In vivo data including in mouse models of human rosacea, atopic dermatitis, general dermatitis, urticaria, and psoriasis	License
	5010	A Novel Therapeutic Target and Clinical Marker for Pulmonary Arterial Hypertension	SCUBE1 gene has been shown to modulate pulmonary endothelial angiogenic potential, proliferation, and apoptosis. In PAH animal models and patients, SCUBE1 levels are decreased and negatively correlate with disease severity and progression, indicating its potential usefulness as a therapeutic target. By modulating pathogenic endothelial dysfunction and serving as a circulatory plasma marker for diagnosis of PAH, SCUBE1 could prove incredibly useful as a therapeutic target and for monitoring severity and progression of the disease.	Respiratory		Other		Chan	Stephen	Med-Medicine	In vivo data	License

	4989	T Cell Receptors Targeting Mutations in RNA Splicing Factors	Pitt researchers isolated genes encoding two unique T cell receptors (TCRs) capable of recognizing peptide epitopes from a mutated RNA splicing factor commonly found in uveal melanoma, chronic lymphocytic leukemia, myelodysplastic syndromes, and breast cancer. When these genes were introduced into a donor T cell, mutation reactivity was conferred without eliciting reactivity against the non-mutated form of the protein. Cancer patients with similar mutations stand to benefit greatly from personalized immunotherapy focused on genetically engineering human T cells with TCRs targeted to this mutated RNA splicing factor.	Oncology		Immuno-oncology	Kammula	Udai	Med-Surgery	In vitro data	License
	4988	T Cell Receptors Targeting Defective DNA Repair Proteins	Pitt researchers have isolated genes encoding two unique T cell receptors (TCRs) capable of recognizing peptide epitopes from mutated proteins found in many cancers. When introduced into a donor T cell, these genes conferred their respective mutation reactivity without conferring reactivity against nonmutated forms of the proteins. Cancer patients with similar mutations in their DNA repair proteins may benefit from genetic engineering of human T cells to express the unique TCRs, making it an attractive new targeted immunotherapy option.	Oncology		Immuno-oncology	Kammula	Udai	Med-Surgery	In vitro data	License
	4976	Championing Hearing Using Accessible Medication Experts at the Pharmacy Counter: CHAMP Online Certificate Program	CHAMP is a self-paced online learning program run on the CANVAS Learning Management System (LMS) platform via the University of Pittsburgh Center for Teaching and Learning. The contents are covered in 10 modules for a total of 4 hours of accredited pharmacy continuing education. The competencies addressed in the modules were determined by a panel of experts representing national organizations of pharmacists, audiologists, and people with hearing loss, as well as OTC hearing device manufacturers. CHAMP provides pharmacist education about hearing loss and hearing aids with a focus on patients versus products.	Otolaryngology		Other	Berenbrok	Lucas	Pharm-Pharmacy & Therapeutics	Consulted with over 40 individuals in customer discovery, including pharmacists, people with hearing loss, hearing aid users, OTC hearing aid manufacturers, and audiologists; landing page has been designed and learning content is under development.	NewCo
	4942	Patient Experience Navigator (PENY)	Our solution is PENY, a patient experience navigator for real-time patient experience analytics. PENY is an app that the patient uses to rate and review all aspects of their experience during the hospital stay. It collects more detailed information than HCAHPS, aggregating information regarding pain, mood, boredom, food, environment, healthcare professionals, and treatment. Additionally, the app can be modified or gamified to appeal to and receive feedback from children. The application analyzes the data in real time, providing immediate feedback that allows healthcare providers to implement changes that lead to better patient outcomes, especially for those with chronic conditions that are in the hospital for an extended duration. Enacting these data-driven changes will also lead to improvements in hospital ratings and an increase in hospital reimbursement.	Other		Healthcare IT	Roy	Eva	Med-Critical Care Medicine	App development and pilot study	License;NewCo
	4936	SToPVTE: Screening to Prevent Venous Thromboembolism	Our product is an electronic health record (EHR)-embedded CDSS that uses existing patient data in real-time to recommend individualized thromboprophylaxis measures based on the most up-to-date assessment of a patient's risk. Unlike other risk assessment instruments, our tool will predict time and type of VTE (i.e., deep vein thrombosis or pulmonary embolus) and generate recommendations for the dose, duration, and type of prophylaxis. In contrast to existing CDSS applications, our product will be compatible with multiple EHR platforms, use patient data in real-time, and automate the decision-making process for prophylaxis. Finally, SToPVTE is a sustainable solution: it captures outcome data for ongoing improvement of risk calculation and interventions to save lives.	Hematology		Other	Machine learning	Neal	Matthew	Med-Surgery	Preliminary data has provided validation of concept. Development of machine learning algorithm is underway in a partnership with UPMC Clinical Analytics and University of Pittsburgh Department of Biomedical Informatics.	License;NewCo
	4854	Novel Ticagrelor Coated Coronary Stent Using a Self-Assembled Monolayer Linker System	Researchers at the University of Pittsburgh have invented a novel vascular stent with inherent antiplatelet capabilities, which therefore requires no antiplatelet therapy after implantation. Ticagrelor, an anticoagulant frequently used in systemic antiplatelet therapy, is tethered to the surface of the stainless-steel stent using a chemical linkage with self-assembled monolayers, which prevents disaggregation of ticagrelor from the stent. This targeted approach mitigates bleeding risk associated with use of longer term systemic antiplatelet therapy and has the additional benefit of preventing blood-metal contact. This stent has been tested in rabbit implant studies and demonstrated 100% patency of the stent after 35 days with no systemic antiplatelet therapy.	Cardiovascular		Medical Device		Pacella	John	Med-Medicine	in vivo data	License
Recently Added	4778	Thinking in Speech: Developing Independent Problem-Solving and Emotional Self-Regulation in Children with Autism	The "voice in our head" is how we think; using this inner voice is how we solve problems and is foundational for effective self-regulation. Children with autism struggle with this. With Thinking in Speech, therapists help children with autism to recognize pre-cursors to feelings of stress when faced with a problem, learn, practice, and apply new problem-solving strategies in situations that create stress, and verbalize the strategy — first to the therapist, but eventually to themselves! Over time, the child becomes the "boss of my brain" and can solve problems and cope in stressful situations without help from parents, teachers, or caregivers. Thinking in Speech is grounded in research in neuro-cognitive development, brain imaging, and traumatic brain disorders.	Other		Other	Autism spectrum	Nathan	Janice	SHRS-Commu Science & Disorders	Methodologies involved in Thinking in Speech have been developed through professional practice with clients of varied ages and economic and racial backgrounds; process pending formalization.	License;NewCo
	4771	Diagnostic for Preventing Necrotizing Enterocolitis (NEC)	Bacteria that escapesbinding by maternal antibodies such as IgA has been associated with later development of NEC. We have developed a bacterial array which allows for determination of the anti-bacterial repertoire--the number of different bacteriathat can be bound--of any given breast milk sample. The breadth of IgA specificity for these bacteria as determined by the array will indicate which milk samples are the most effective at preventing NEC, and will allow NICU doctors and donor milk banks to target milk samples to the most at-risk infants. The array is both customizable to customer needs and fast to run with a 24 hour turn-around time. The array can also be repurposed to combat other infant health risks, such as bacteremia and viremia.	Pediatrics/Neonatology		Other		Hand	Timothy	Med-Pediatrics	Device designed Proof of principle in place Post-hoc clinical trial pending	License;NewCo
Recently Added	4735	One-step Gene Therapy for Duchenne Muscular Dystrophy	The investigators designed a novel dual-cassette adeno-associated viral (AAV) vector therapy that combines gene therapies to recover dystrophin function, specifically targeting and reducing inflammatory responses associated with DMD. These vectors have been tested in mouse models of DMD. After a single dose, robust dystrophin expression was observed in both the cardiac and skeletal muscle of treated mice, in addition to reduced inflammation. The single-cassette with dystrophin gene replacement alone was not effective in reducing inflammation, indicating that this is the only DMD gene therapy that targets an inflammatory pathway in DMD that plays a key role in disease progression but while promoting dystrophin expression.	Rare Diseases		Gene Therapy		Wang	Bing	Med-Medicine	Prototype, in vivo data collected	License
Recently Added	4729	Small Molecules Maintaining NMNAT2 Levels Prevent Degradation	Pitt researchers have undertaken a program to develop small molecules that augment NMNAT2 levels in the setting of neuronal injury. These approaches center on inhibiting Phr1 (MYCBP2), the E3 ubiquitin ligase that normally targets NMNAT2 for proteasomal degradation. During this process, small molecule inhibitors of Phr1/MYCBP2 will be identified, modified, refined and tested in relevant cell and animal models. While previous studies have sought to understand the molecular basis of Wallerian degeneration (WD), Pitt researchers have developed a first in class compound that holds the potential to prevent NMNAT2 degradation.	Neuroscience		Small molecule	Small molecule	Chen	Beibei	Med-Medicine	In vitro data	License
	4712	CyteSolutionsLens: Drug-Eluting Contact Lens Technology	Developed at the McGowan Institute for Regenerative Medicine in conjunction with clinical experts from the University of Pittsburgh Medical Center's Eye & Ear Institute, the CyteSolutions Lens is a soft lens-based therapy and features use of a low-dose, sustained, locally releasing drug, providing convenient application with a familiar modality and long-term relief of symptoms. The CyteSolutions Lens releases a drug targeting a novel underlying pathway of dry eye inflammation not previously targeted in currently available therapies. Unlike competitors such as Restasis®, Cequa™, Xiidra®, and over the counter tear substitute eye drops, our therapy can be applied infrequently and overnight, with potential to provide days-long relief. Laboratory in-vitro tests have also shown ability of the CyteSolutions Lens to release the active ingredient for days, reducing frequency of treatment and creating longer lasting symptom relief.	Ophthalmology		Drug delivery		Nolfi	Alexis	Bioengineering	In vivo data	License;NewCo
Recently Added	4673	BRITE Mobile App and Database	BRITE is an app-supported inpatient intervention that could help to protect the patient from recurrent suicidal behavior during a high-risk period while the outpatient therapist is initiating treatment. BRITE has emotion regulation strategies that youth are encouraged to practice at least once daily. These strategies are supported by images, music, videos and text chosen by the patient as helpful for coping with suicidal urges.	Other		Other	Digital therapeutic;Health care IT	Brent	David	Med-Psychiatry	Prototype	License
	4623	PDLIM2 Therapy for Cancer	PDLIM2 is a protein that acts as a tumor suppressor and whose expression is often repressed in various cancers. Repression of PDLIM2 is linked to cancer development, progression, metastasis, and therapy resistance, including complete resistance to anti-PD-1 therapy and epigenetic drugs. University researchers have developed several clinically feasible methods to restore PDLIM2 expression and/or function in tumor and tumor-associated cells, which promotes antitumor activity and synergizes with anti-PD-1 therapy. In combination with chemotherapy and anti-PD-1 therapy, restoration of PDLIM2 has demonstrated complete remission of most animals with lung tumors, establishing a new foundation for PDLIM2-based combination therapies for cancer treatment. Additionally, PDLIM2 expression and function in tumor cells and tumor-associated cells can be used as a marker to assess cancer risk, diagnosis, prognosis and treatment response.	Oncology		Antibody,protein,peptide	Protein	Qu	Zhaoxia	Med-Microbiology and Molecular Genetics	In vivo data	License

	4566	Oncolytic Viruses Expressing Cytokine IL-36γ for Cancer Therapy	Novel oncolytic vaccinia viruses were constructed to express the secreted form of IL-36γ. The virus infects cancer cells, induces oncolysis, and secretes the cytokine from the infected cancer cells. The addition of IL-36γ enhances the antitumor activities of the oncolytic viruses by promoting an adaptive T cell-mediated immune response and stimulating the immunogenic tumor microenvironment. In models of colon cancer, pancreatic cancer, and melanoma, direct injection of the armed virus led to superior antitumor effects.	Oncology		Drug delivery		Guo	Zongsheng	Med-Microbiology and Molecular Genetics	In vivo data	License
	4518	Targeting Highly Tumor-specific Long Non-coding RNAs for Cancer Diagnosis, Prognosis, and Therapy	Investigators at the University of Pittsburgh have identified a group of cancer-related lncRNAs as novel biomarkers of cancer. In addition, they developed methods of detecting and inhibiting these molecules in cancer cells. Researchers paired the detection of these lncRNAs with genetic and clinical data from 1,023 breast tumor samples and 24 breast cancer cell lines. By integrating the lncRNA profile with clinical outcome data, investigators have concluded that these lncRNAs are important players of tumorigenesis and clinical prognosis. Among the 2,123 lncRNAs identified, one in particular appears to have higher expression in nine different cancer types including breast cancer. Inhibition of these lncRNA in breast cancer cells led to cell death, suggesting therapeutic potential in treating breast cancer.	Oncology		Antisense,RNA		Yang	Da	Pharm-Pharmaceutical Science	In vitro data	License
	4479	Vital-Dent: A Revitalizing Root Canal Solution	Vital-Dent™ is a revitalizing root canal implant for RCT-treated teeth. It consists of a naturally-derived biomaterial and achemotactic factor which promote migration of progenitor cells from the peri-apical space into the tooth, stimulateangiogenesis and neurogenesis into the tooth, and fostera pro-remodeling immune response to facilitate these. Similar to conventional RCT fillers, Vital-DentTMis inserted into the canal space, producing vital tissue in the tooth canal that guards against bacterial invasion and tooth injury by restoring sensation, intra-pupal pressure, and immune responsiveness. Compared to conventional RCT, Vital-DentTMwill reduce clinical time, number of procedures, and total care cost. Vital-DentTMis an attractive alternate for younger patients seeking to maintain their teeth, and for practitioners wishing to distinguish their practice.	Dental		Medical Device		Taboas	Juan	Dent Med-Oral and Craniofacial Sciences	In vitro proof of concept, pilot in vivo test and refinement of prototype	License;NewCo
	4461	NKCC Inhibitors for Neuroprotection Following a Stroke	To overcome the limitations of bumetanide as a stroke treatment,researchers havedeveloped lipophilic and uncharged bumetanide derivatives thatpenetrate theblood–brain barrier more easily. Changes to the structure of the bumetanide molecule could also curb diuresis by conferring greater selectivity for NKCC1 —which is primarily expressed in the brain —over NKCC2 in the kidney. In a mouse model of stroke, one of the new compounds, STS66, was more effective than bumetanide at reducing cell death, swelling, and neurological deficitsin the weeks after the ischemic event. The mice receiving STS66 even lived longer.	Neuroscience		Small molecule		Sun	Dandan	Med-Neurology	In vivo data	License
Recently Added	4454	Approaches to Counteract Age-related Cognitive Decline	Researchers at the University of Pittsburgh have discovered that certain exercise-induced circulating factors may serve as useful biomarkers to detect the efficacy of a rehabilitation program to counteract age-related declines in tissue and organ function. For instance, one can expect that different programs (e.g., aerobic exercise, resistance exercise, yoga/mindfulness or health education) will have different effects on the structural and functional cognitive outcomes in aged individuals. The early identification is advantageous, as it may allow clinicians to determine early on whether a program is effective and enables the program to be tailored to the patient. The same research group has also developed a novel technology—exosome engineering and transplantation—for delivery of Klotho transcripts, messages to promote muscle and brain health. This important finding can reveal the specific therapeutic signals that drive Klotho anti-aging effects.	Musculoskeletal	Neuroscience	Antibody,protein,peptide	Aging;Peptide	Ambrosio	Fabrisia	Med-Physical Medicine & Rehabilitation	In vivo data	License
	4453	A Novel Multifunctional Drug Delivery System for Chemo-Gene Combination Therapy	The present invention is a novel micellar system composed of cationic amphiphilic polymers for co-delivery of small molecule chemotherapy drugs and therapeutic genes. Researchers at the University of Pittsburgh have developed novel polymeric carriers composed of PEG hydrophilic segments and cationic moieties. These polymers have the ability to form micelles, which can effectively load hydrophobic drugs while simultaneously forming complexes with nucleic acids. When co-loaded with a drug and plasmid DNA, these micelles are observed to be significantly smaller and more stable than particles loaded with the drug alone. In this system, the multivalent charge–charge interactions between the cationic polymer and plasmid DNA serve as a simple approach to cross-link the micelles, thus making these micelles more stable than free micelles or micelles loaded with small molecule alone. As a working example, investigators developed a polymer for co-delivery of IL-36γ expression plasmid and doxorubicin (Dox) to lung metastasis of breast cancer. The use of this polymer resulted in significantly higher gene transfection in both lungs and tumors compared to control and, in addition to this improved anti-metastatic effect, synergistically enhanced the type I immune response and decreased immunosuppressive cells in the lung.	Oncology		Drug delivery	Drug delivery	Li	Song	Pharm-Pharmaceutical Science	In vivo, mice	License
Recently Added	4368	YouBiotic	YouBiotics are created from an individual's own bacteria which facilitates engraftment in the small intestine and improves tolerance. Conventional probiotics can produce gastrointestinal discomfort and do not colonize the intestines. We have tested YouBiotics in a set of rigorous metabolic cage experiments in mice. Our data indicates that YouBiotics do not alter the animal's metabolism, and that the weight changes are not a result of water loss, increased activity, or loss of lean mass. Taken together, YouBiotics act to scavenge dietary fats from the intestines beforethey can enter the blood stream. In this way, dietary calories from fat can be significantly reduced, facilitating reductions in fat mass and blood triglycerides with long-term use. Because YouBiotics is a probiotic, we intend to market it as a food supplement reducing carry-over costs and development time associated with FDA approval. Our current manufacturing cost estimates indicate that YouBiotics can be a low-cost weight management therapy with a price point of ~$99-$199for a one-month supply, which represents as much as 93% cost reduction in comparison to FDA regulated weight loss therapeutics.	Other	Other	Other		Acharya	Abhinav	Chem/Petroleum Engineering	Completed: in vivo experimentation in small animals In progress: preclinical study in large animal model	License;NewCo
	4358	Preserving Harvested Fat Between Grafting Procedures	The multi-functional vessel is a 10cc chamber with Luer Lock ports on both ends and a built-in filtration system. After harvesting fat graft material, the vessel interfaces with the harvesting syringe for easy transfer. Then cryo-protectant solution is added to the vessel and it storedin a hospital freezer. When necessary, thawing and washing occurs in the same closed system of the storage vessel. Currently, onlyone tissue banking company that offers off-site cryo-storage of adipose tissue grafts,andshipping the material back and forth is expensive and complicates procedure scheduling. Because our system involves storing the tissue on-site, it enables multiple treatments with minimal additional costs after the original fat harvest and processing.	Plastics		Medical Device		Rubin	Joseph	Med-Plastic Surgery	Prototype	License;NewCo
	4353	Affinity-Enhanced Biotin-Binding CAR T Cells: A Universal Cancer Treatment	With our system, patients would receive two treatments. The first is a biotin-tagged antibody that binds to tumor cells. The second is CAR-Ts that react with the tagged antibodies on the tumor cells. By separating the tumor-associated antigen from the CAR T cell, this system is much easier to adapt to changes in tumor antigen expression, allowing for infusion of additional antibodies targeting new tumor antigens. Thisoffers the potential for lower toxicity because the CAR T cell potency is directly controlled by the concentration of tagged antibody. Furthermore, monomeric streptavidin 2 (mSA2) biotin-binding protein domain is engineered to have a25-fold stronger affinityfor target cells compared to other biotin-binding CARs, leading to greater T cell activation and antitumor response. When incubated together with target cells and various biotinylated tumor-specific antibodies, our adaptable mSA2-CARTs had comparable potency to traditional CARs.	Oncology		Cell therapy		Lohmueller	Jason	Med-Immunology	In vitro data	License;NewCo
	4279	Gene Therapy for Male Infertility without Germline Transmission	To establish the proof-in-principle for testicular somatic cell defects, we designed an adenovirus (Ad) vector to introduce a therapeutic human androgen receptor (hAR) gene into an AR-deficient mouse model of human NOA. Ad-hAR injections restored spermatogenesis in 90 percent of seminiferous tubules in the testes. Histology in these mice showed that Ad-hAR transfects only Sertoli cells — somatic cells that facilitate spermatogenesis— and not the sperm or sperm producing cells. As a result, none of the treated males' progeny carried the transgene. In parallel, we devised a strategy for ex vivo gene editing (using CRISPR/Cas9) followed by transplantation of germline stem cells. In the case of homozygous recessive disease, we outline how this approach can be deployed for germline gene therapy without germline transmission to progeny. For men faced with one of the most intractable types of infertility, our gene therapy method offers a potential cure without the ethical concerns of germline transmission. As societal concerns about germline gene editing evolve, the technologies described here can be used to purposefully eliminate the world's most devastating diseases from families.	Urology		Gene therapy		Orwig	Kyle	Med-OB-Gyn & Reproductive Science	In vivo data	License
	4267	Ribosomal Protein-Based Diagnostic and Prognostic Test for Cancer	To identify and classify RP transcript patterns, we applied an advanced form of machine learning called T-distributed stochastic neighbor embedding (T-SNE) that uses a variety of linear and non-linear relationships to cluster data. When applied to human tissue data from the cancer genome atlas, this method was 93%accurate at distinguishing between tissue types and more than 98%accurate at discriminating tumors from normal tissue. In at least ten different common tumors typesincluding hepatocellular carcinoma, kidney, brain and endometrial cancer,the pattern of RP transcripts was also highly predictive of survival. Our proprietary T-SNE-based RP transcript analysis program could form a clinically useful bioinformatics platform to accurately determine a tumor's tissue of origin, classify known tumors into subtypes, and stratify patients into high-andlow-risk categories. This information will be useful for determining the most appropriate treatment plan for individual patients.	Oncology		Molecular diagnostic		Prochownik	Edward	Med-Pediatrics	Software	License

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	4250	Novel Glycine Receptor Modulators for Analgesia	Recognizing that glycine receptors are responsible for the analgesic effects of marijuana, we screened a library of drug-like molecules for structural compatibility with the same glycine receptor binding site as THC. A representative compound from this group – ZINC08 – was even more effective than THC at enhancing human glycine receptor function in vitro. In mouse behavioral tests, ZINC08 reduced the effects of inflammatory pain and boosted the efficacy of a sub-therapeutic dose of morphine. Patients and prescribers could use ZINC08 and other glycine receptor modulators in its class to reduce the necessary dose of opioids for pain management, eliminating side effects such as dependence, tolerance, addiction, sedation, and nausea.	Central Nervous System	Small molecule		Xu	Yan	Med-Anesthesiology and Perioperative Medicine	In vitro and in vivo behavioral data	License
	4181	Chemical Pancreatectomy Using Ethanol Infusion	By one theory of chronic pancreatitis, the exocrine pancreas, which produces digestive enzymes, creates a toxic environment that then kills off the otherwise healthy insulin-producing islets of the endocrine pancreas. We discovered that infusing pure ethanol into the pancreatic duct of a mouse leads to complete destruction of the problematic exocrine pancreas while leaving the endocrine pancreas intact. In a model of chronic pancreatitis, ethanol infusion halted pancreatic islet destruction and improved insulin production. As opposed to a traditional pancreatectomy, our method can be performed endoscopically for minimal invasiveness. Also, because ethanol infusion spares the hormonal functions of the pancreas, our method could treat the painful and carcinogenic aspects of pancreatitis while also reducing patients' risk of developing diabetes.	Endocrinology	Other		Gittes	George	Med-Surgery	In vivo mouse data, in situ primate surgical protocol	License
Recently Added	4169	ThreadRite IV	ThreadRite is a modified standard catheter that immediately alerts clinicians to vein entry. Consisting of a modified standard IV cather connected to a lightweight reusable detection unit, ThreadRite employs a guidewire to help clinicians insert the IV properly on the initial attempt. Once in the vessel, the guidewire aids in catheter advancement. ThreadRite has the potential to reduce patient pain and lower provider costs associated with this incredibly common problem.	Cardiovascular	Medical Device		Dezfulian	Cameron	Med-Critical Care Medicine	The research has progressed to testing of the sensor in pigs, and the team is planning an initial human for the end of 2021/beginning of 2022. The team has also made good progress on new designs of the hardware that have been tested through additional user discovery.	License
	4124	Targeting Genetic Changes in IDH-Mutant Gliomas with a Novel Use of an FDA-Approved Drug	Our novel use of the drug works by reversing the immune-evasive properties of IDH-mutant gliomas. The immunotherapeutic properties of this compound are due to activation of immune target receptors specifically in cancer cells, rendering them significantly more susceptible to killing by NK cells and T cells. In addition, treatmentreduces tumor size and growth by modulating IDH-mutant cancer cell death and differentiation. Compared to current broad-spectrum treatments like tumor resection, radiation, and chemotherapy, our genetically targeted immunotherapeutic approach may avert tumor recurrence.	Oncology	Small molecule	Small molecule	Amankulor	Ndukaku	Med-Neurological Surgery	In vivo mouse and human data	License
	4085	Targeting Chromosomal Rearrangements for Treatment of Cancer	The present invention relates to methods of detecting and treating patients suffering from cancer or a pre-malignant or neoplastic condition and are carrying one or more specific fusion genes. These specific fusion genes yield insights into disease progression and enable clinicians to tailor specific genome therapies. The chromosomal breakpoints of significant numbers of fusion genes have been identified; these breakpoints not only serve as cancer markers but also provide unique opportunities to treat human cancers using genome editing and genome targeting technologies. Once fusion transcripts are detected in serum samples, novel treatment options include administering a therapeutic effective amount of an agent at the breakpoint that inhibits the fusion gene of interest.	Oncology	Other diagnostic		Luo	Jianhua	Med-Pathology	In vivo data	License
Recently Added	4062	Tetrahydrocannabinol (THC) Sensor for a Marijuana Breathalyzer	Pitt researchers have developed a novel tetrahydrocannabinol (THC) sensor using single walled carbon nanotubes (SWCNTs) to quantify THC dissolved in ethanol or in a dried state. The sensor can be implemented in a handheld breathalyzer to quantifiably measure THC in someone who is under the influence of marijuana. Compared to competing THC breathalyzer technologies, which are expensive or involve complicated multistep processes, this sensor boasts high sensitivity, low power consumption, and low fabrication costs.	Other	Medical Device		Star	Alexander	Chemistry	Concept	License
	4054	Reversing Fosfomycin Resistance	Researchers at the University of Pittsburgh have discovered a compound called ANY1 that selectively blocks the mechanism by which bacteria resist fosfomycin treatment. When applied together with ANY1, fosfomycin is once again effective against formerly resistant bacteria. Bacteria mount resistance by deploying fosfomycin-modifying enzymes, most frequently FosA. ANY1 restores fosfomycin sensitivity in these pathogens by competitively inhibiting FosA. In control experiments, ANY1 did not have any impact on bacterial growth when applied alone, nor was it efficacious in conjunction with fosfomycin against a strain of E. coli that was engineered to lack the FosA gene. This cocktail presents the opportunity to fight back against so-called superbugs that evade all known current treatments.	Infectious Disease	Small molecule		Sluis-Cremer	Nicolas	Med-Medicine	In vitro data	License
	4010	Rapid Response Preventative Vaccines for Zika Virus Outbreak	Pitt researchers have developed a recombinant adenoviral vector-expressing codon-optimized subunit recombinant ZIKV E vaccine combined with a skin-targeting vaccine delivery technology to specifically create advantages in immunogenicity, economy, and safety in order to enable broad, effective clinical deployment. The vaccine delivery strategy utilizes an intracutaneous microneedle array (MNA)-based delivery system, found to be superior to intramuscular administration in both the potency and duration of the induced immune response. The MNA vaccine delivery system also affords unique advantages in reproducibility, safety, manufacturing, and distribution, by relieving pressure on the cost-intensive "cold chain" required to preserve vaccine potency within a restricted temperature range for delivery and distribution in developing countries. The synergistic integration of this effective vaccine and delivery method has distinct advantages critical for widespread clinical deployment.	Vaccines	Vaccine		Gambotto	Andrea	Med-Surgery	In vivo data	License
	3955	Triple Variable Index	A novel profiling system, the Triple Variable Index (TVI), will allow clinicians to predict outcomes and stage timely interventions by integrating data representing cardiovascular and neurologic system functions moment-to-moment for individual patients responding to anesthetics and surgery. The TVI system measures mean arterial pressure (MAP), Bispectral Index (BIS), and minimum alveolar concentration (MAC),revealing a distinct pattern of organ system function. These measurements show the tightly regulated functions of multiple organ systems that work in concert to maintain homeostatic balance, and mapping their function over time yields connections to postoperative outcomes. The TVI method provides rapid analysis on an individual basis for a wide population of surgical patients. Surgical cases can be separated into distinct clusters combining Triple Variable Indexing and K-means cluster analysis based on oneof three possible physiological states during surgery represented by an elevated, mixed, or depressed TVI value; further, TVI depression has been shown to correlate with postoperative mortality. These developments will allow clinicians to identify potential points of clinical interventions in a timely manner to decrease patient risk of postoperative death, as well as reducing costs for patients and care providers alike.	Surgery	Other		Kaynar	Ata	Med-Critical Care Medicine	Prototype	License;NewCo
	3916	Mitoparib: A Mitochondrial PARP Inhibitor that Counteracts Metabolic Stress	To hone in on mitochondrial PARP, we added a targeting sequence to the PARP-inhibitor veliparib, which is currently in multiple late-stage clinical trials for cancer, to create mitoparib. Whereas veliparib fights cancer by hastening DNA damage to invoke cell death, mitoparib protects environmentally-stressed cells against cell death by inhibiting PARP-related NAD+ depletion in the mitochondria while permitting homeostatic PARP-related DNA repair in the nucleus. Experiments with oxygen- and glucose-deprived rat neurons demonstrate that mitoparib reduces mitochondrial PARP activity and ameliorates mitochondrial swelling associated with necrosis. In mouse embryos, mitoparib decreases radiation-induced cell death. Mitoparib presents an exciting solution to targeting mitochondrial PARP activity and prevent cell death.	Oncology	Small molecule		Wipf	Peter	Chemistry	In vivo data	License
	3868	Oncolytic Viruses Armed with Membrane-Associated Immunomodulatory Molecules for Cancer Therapy	Oncolytic vaccinia viruses armed with a gene encoding a membrane-associated fusion protein that includes an immunomodulatory molecule can be used to deliver membrane-associated immunomodulatory molecules to the tumor site. Rather than simply lysing the tumor cells and/or secreting the cytokine from the cancer cell, these cytokines are expressed on the cancer cell membrane. This helps to deliver cancer-fighting compounds to areas where they are most needed as well as reducing possible adverse toxicity by avoiding systemic diffusion. Candidate immunomodulatory molecules for this delivery method include cytokines, such as cytokine IL-2, and natural or man-made protein domains and peptides. This method can be used to achieve enhanced anti-tumor immunity and therapeutic effects, and has been demonstrated on a colon cancer model using an oncolytic vaccinia virus expressing membrane-associated fusion protein IL-2-GPI.	Oncology	Drug delivery	Immuno-oncology	Bartlett	David	Med-Surgery	In vivo data	License
	3854	Compounds that Convert Acinar Cells into Insulin-Producing Beta Cells	Researchers at the University of Pittsburgh have discovered a compound which, when administered to diabetic mice or non-human primates (NHP) in therapeutic amounts, has the potential to normalize blood glucose by transforming pancreatic acinar cells into beta cells. These acinar-derived beta cells migrate into and embed themselves within the microenvironment of the islets of Langerhans, conferring distinct advantages beyond insulin production, including proximity to blood vessels that provide for increased efficiency of insulin secretion. The acinar-derived insulin-positive cells also express Glut2, suggesting that these cells share features with mature insulin-producing cells.	Endocrinology	Small molecule	Small molecule	Esni	Farzad	Med-Surgery	In vivo data	License

	3811	p97 ATPase Inhibitors for Cancer and Neurodegeneration	Structural analysis indicates that these compounds bind allosterically to act literally as a "wrench in the works", blocking the motion of the p97 protein subunits. Inhibition of p97 ATPase activity triggers downstream cellular effects, including the suppression of cellular proliferation that makes cancer such a dangerous disease. And because these compounds specifically inhibit p97, they offer the possibility of treating a wide array of ailments with fewer side effects than drugs acting on broader pathways; neurodegenerative diseases, for example, display dysregulation of protein homeostasis via p97 and have the potential to be treated with these inhibitors.	Neuroscience		Small molecule		Huryn	Donna	Pharm-Pharmaceutical Science	In vivo data	License
Recently Added	3620	CardioSense	CardioSense is a handheld, multi-array biosensor that screens for cardiovascular risk by detecting FDA-approved cardiac markers in just a few drops of blood, similar to the function of a glucose tester. CardioSense screens for cardiac markers using aptamers, which are single-stranded nucleotide sequences that are synthesized to bind targets with high sensitivity and specificity. Two targets of interest for CVD are brain natriuretic peptide and Troponin-T, which are indicators of cardiac stress or injury. Aptamer binding is detected using an impedimetric device, allowing for a quick, simple, and cost-effective mode of detection compared with blood assays (e.g., ELISA) or imaging tests (e.g., CT) conducted in the hospital and diagnostic laboratories.	Cardiovascular		Medical Device		Kumta	Prashant	Bioengineering	Optimization in the laboratory	License
	3178	A Simple, Effective, and Dual-Functional Drug Delivery Platform for Hydrophobic Agents	A novel drug formulation based on PEGylated FTS, a synthetic farnesylcysteine mimetic, acts as a potent and particularly non-toxic antagonist of the Ras family proto-oncogenes present in one-third of human cancers. FTS inhibits the growth of Ras-dependent tumors with no significant toxicity; in addition to its antitumor activity in mice and humans, FTS also exhibits anti-inflammatory activity. PEGylation serves to improve the solubility of FTS, which has a hydrophobic nature and limited bioavailability. The PEG-FTS conjugate forms small-sized micelles, a type of delivery system that has gained considerable attention due to micelles' small size and ability to solubilize water-insoluble anticancer drugs and accumulate specifically at tumor sites. In this new formulation, both the anticancer drug and the PEG-FTS carrier display antitumor activity and can synergize to amplify the effect. Further, the drug-loading capacity and formulaic stability of the PEG-FTS micellar system can be further improved via incorporation of a drug-interaction motif, leading to the creation and development of highly effective therapeutics with minimal toxicity at a low cost in a timely manner.	Oncology		Small molecule		Li	Song	Pharm-Pharmaceutical Science	In vivo data	License
Recently Added	3146	An Organ Perfusion Stent for Transplant Organ Recovery	This novel stent design eliminates ischemic injury by isolating the vessels of the abdominal organs and perfusing them with oxygenated blood. The device is placed percutaneously and requires no incisions. The design of the stent effectively creates two zones: a central lumen of this stent maintains uninterrupted flow thus avoiding strain on the dying heart, while the other provides pulsatile and oxygenated perfusion of only the abdominal organs. Consolidation of abdominal organ branch vessels into a single zone greatly simplifies device placement compared to traditional stent approaches. The longitudinal strut design expedites removal, if necessary. By perfusing donor organs without impacting the natural cardiac death of a transplant donor, fewer transplantable organs will be wasted.	Cardiovascular		Medical Device		Tillman	Bryan	Med-Surgery	In vitro and in vivo data; animal study data; prototype available	License;NewCo
	3007	SimultaneousInhibition of Wnt, TGF-beta and Hippo Signaling to Treat Cancer, Organ Fibrosis and Neuropathic Pain	Building on knowledge of cancer cell reprogramming, researchers have identified a pipeline of novel anticancer agents with dual action on cell proliferation and EMT. C19 is a promising small molecule candidate with remarkable inhibitor activity against Hippo, Wnt and TGF-beta pathways: it induces TAZ degradation through activation (phosphorylation) of Hippo kinases MST/LATS and the tumor suppressor kinase AMPK, which is an upstream regulator of the degradation complex of YAP. It has been demonstrated that C19 inhibits cancer cell migration, proliferation, and resistance to doxorubicin in vitro, and exerts strong anti-tumor activity in mouse tumor models. By simultaneously targeting multiple EMT pathways, this novel compound provides a new class of agents that have the potential to not only suppress cancer progression but also prevent its recurrence.	Oncology		Small molecule	Small molecule	Rebbaa	Abdelhadi	Med-Pathology	In vivo data	License
	2659	An Oral Candidate Prevention Therapyfor Melanoma	Sulforaphane (SFN) is a naturally occurring compound found in vegetables such as broccoli, cabbage, and cauliflower, among many others. SFN is renowned for its anti-cancer properties and is easily isolated from natural sources. Using our identified formulation and dosage, SFN effectively delayed melanoma progression in mice. Additionally, we identified possible biomarkers for the progression of atypical nevi to melanoma.	Oncology		Small molecule		Kirkwood	John	Med-Medicine	In vivo data	License
	2474	Predicting and Managing Cardiorespiratory Instability	Machine learning principles, coupled with human physiological data, can enable a data-driven prediction modeling approach to predict if and when patients are likely to develop future instability. Hemodynamic Monitoring Parsimony repurposes routinely acquired non-invasive hemodynamic data to predict cardiorespiratory insufficiency prior to the onset of severe symptoms, determine which additional biomarkers and measuring frequency will improve the accuracy and specificity of these predictions, assess whether the patient is responsive to process-specific interventions, determine if resuscitation has effectively restored tissue perfusion, and identify minimum criteria as to be clinically relevant. This data-driven prediction modeling approach will enable healthcare professionals to predict future instability in patients both at the bedside and in remote settings, yielding immense improvements in patient safety, surveillance and care.	Cardiovascular		Medical Device		Pinsky	Michael	Med-Critical Care Medicine	Prototype	License
Recently Added	1679	Cortical Brain Control of Bionic Limb	While cortical activity patterns have been used for the control of a cursor on a computer screen, this technology extends well beyond past applications to include control of a multi-jointed prosthetic device for direct real-time interaction with the physical environment ('embodiment'). The system allows movement in any direction in 3-dimensional space as well as the opening and closing of the hand at the end of the arm. In addition to the three dimensions of movement, the subjects' cortical signals also proportionally controlled a gripper on the end of the arm which creates a far higher level of difficulty than previous virtual experimental devices.	Rehabilitation/Mobility	Central Nervous System	Medical Device	Digital therapeutic;Human performance	Velliste	Meel	Med-Neurobiology	Phase I studies in paralyzed individuals	License;NewCo