No.	Category	Modality, etc.	Title	Summary
1	Neurological disorders	Protein	**Therapeutic Protein for Promotion of Axon Regeneration in PNS and CNS**	We have identified a novel molecule that promotes axonal regeneration in the peripheral nerve and central nerve. This GFRa1 accelerated the rate of axonal regeneration (in vitro and in vivo), thereby restoring sensory function and tibialis anterior muscle function in vivo. The GFRa1 can use as clinical applications for nerve regeneration drug and nerve regeneration inducer. We would like to elucidate the mechanism based on our RNA-sequencing results and explore other drug discovery using our established evaluation system. GFRa1 is known as the glial cell line-derived neurotrophic factor (GDNF) receptor, but no reports directly related to peripheral nerve regeneration and axon regeneration.
2	Neurological disorders	Peptide	**A new therapeutic peptides for Alzheimer's disease**	We propose a new therapeutic strategy for Alzheimer's disease (AD). Here, we showed that a short peptide p3-Alcβ9-19 is transferred into the brain satisfactorily by peripheral administration, which allowed us to develop the transdermal administration procedure with p3-Alcβ9-19 pharmaceutical formulation. - Effective with only 11 peptide sequences - Can be administered peripherally by subcutaneous or transdermal absorption - Already tested in mice, rats and monkeys - Significantly activates mitochondria in the brain after a single peripheral administration - The preclinical stage has been completed and we will begin first-in-human (FIH) clinical trials. https://www.embopress.org/doi/full/10.15252/emmm.202217052
3	Neurological disorders	RNA	**Novel suppressors of TDP aggregation for the therapeutic implication of ALS and FTLD**	We have identified novel suppressors of TDP aggregation that has the potential for the therapeutic indications of ALS and FTLD. - They have significantly suppressed the aggregation of TAR DNA binding protein. - The molecule did not affect transcription of other molecules. - We are planning in vivo study with ALS and FTLD models. https://pubs.acs.org/doi/10.1021/jacsau.4c00566
4	Neurological disorders	Small Molecule・Antibody etc.	**A neutrophil NETs inhibitor for axon regeneration**	We cleared an increase or decrease in the number of neutrophils delayed or promoted macrophage infiltration from the epineurium into the parenchyma and the repair process in Wallerian degeneration (WD). Abundant neutrophil extracellular traps (NETs) were formed around neutrophils, and its inhibition dramatically increased macrophage infiltration into the parenchyma. Furthermore, inhibition of either MIF or its receptor, CXCR4, in neutrophils decreased NET formation, resulting in enhanced macrophage infiltration into the parenchyma. Moreover, inhibiting MIF for just 2 h after peripheral nerve injury promoted the repair process. These findings indicate that neutrophils delay the repair process in WD from outside the parenchyma by inhibiting macrophage infiltration via NET formation and that neutrophils, NETs, MIF, and CXCR4 are therapeutic targets for peripheral nerve regeneration. https://www.life-science-alliance.org/content/5/10/e202201399
5	Drug Delivery System	LNP	**A Novel Lipid for Hepatic stellate cells (HSC)**	We have developed a LNP that exhibited the delivery specificity for stellate cells in liver. We can disclose invitro and in vivo data in Bio Euro Spring.
6	Drug Delivery System	LNP	**Optimized LNP for the spleen delivery**	We have identified a novel component with our original lipid effectively delivering mRNA into Dendritic cells in the spleen and exhibiting mRNA expression in vivo.
7	Drug Delivery System	LNP	**Novel Helper Lipids that accelerate endosomal escapes.**	We have developed new helper lipid enhancing endosomal membrane fusion. With the combination with cationic lipids(e.g. MC3,ALC,etc), our lipids improve mRNA expression.
8	Drug Delivery System	LNP	**Lipid nanoparticles for ribonucleoprotein delivery for in vivo genome editing**	The delivery of the CRISPR/Cas ribonucleoprotein (RNP) has received attention for clinical applications owing to its high efficiency with few off-target effects. Lipid nanoparticles (LNPs) are potential non-viral vectors for the delivery of RNPs. We have developed ionizable lipids for the hepatic delivery of RNPs.Our optimal ionizable lipid exhibited a more than 98% reduction in transthyretin protein after a single dose with no obvious signs of toxicity. https://www.cell.com/iscience/fulltext/S2589-0042(24)02153-9
9	Drug Delivery System	LNP	**Novel Delivery programs for NK cells for cancer treatment**	NK cells are effective effector cells against cancers that have mutated to evade attack from T cells.We have successfully developed lipid nanoparticles capable of efficiently introducing RNA into human NK cell lines with less toxcity. The LNP we have developed includes our original lipid with an optomized fromulation specific for NK cells. We can provide the LNP for company's evaluation under MTA.
10	Rare diseases	RNA・Gene Therapy	**Programmable “srRNA” therapeutics to induce skipping of target exons - Alternatives to splicing regulatory antisense oligonucleotides-**	We have developed a programmable splice regulatory RNA "srRNA" that induces skipping of target exons. "srRNA" has potential as a superior therapeutic alternative to splicing-regulated antisense oligonucleotides. Unlike antisense nucleic acid drugs, srRNA can be expressed from vectors and is considered less toxic than U7 chimeric RNA. Potential target diseases for this proposal include the followings. ・Inherited Diseases Caused by Abnormal Exons ・Inherited Diseases Treated through Exon Skipping　eg. Muscular Dystrophy (MD), Myelodysplastic syndromes (MDS) https://www.sciencedirect.com/science/article/pii/S1097276523009644
11	Oncology	Small Molecule	**Pancreatic cancer treatment drugs**	We have confirmed that a combination of roseoflavin (RoF), a competitive inhibitor of the riboflavin metabolic pathway, and a MEK inhibitor significantly suppressed the tumor growth of pancreatic cancer cell lines transplanted subcutaneously into mice. Furthermore, we conducted structural modifications of roseoflavin and identified compounds with higher efficacy and lower toxicity than the existing RoF in both in vitro and in vivo studies.
12	Oncology	Antibody	**Intracellular delivery of anti-interleukin-6 and anti-interleukin-6 receptor antibodies and inhibition of cancer cell growth using PIECE**	Overexpression of IL-6 in cells has been reported in various diseases, including cancer. Intracellular IL-6 is considered a promising therapeutic target, but the difficulty in delivering anti-IL-6 antibodies directly into cells has been a challenge. We have created a unique anti-IL-6 composition and successfully administered it intracellularly.
13	Oncology	Antibody	**Treatment resistance reducing agent for treatment-resistant cancer**	This invention relates to a novel agent for reducing treatment resistance against treatment-resistant cancers. The active ingredients of this agent are IL-34-specific antibodies and their fragments, which inhibit the binding of IL-34 to CSF-1R. In the course of researching the mechanism of drug resistance, a type of cancer treatment resistance, it was experimentally discovered that IL-34 is involved in drug resistance.
14	Oncology	middle-molecule	**Hydrophilic-hydrophobic copolymers carrying Dichloroacetic acid on side chain and mecical use therof**	Hydrophilic–hydrophobic copolymers composed of a hydrophobic block carrying dichloroacetic acid via ester or amide linkage and a hydrophilic poly(ethylene glycol) block. These copolymers self-assemble into nanoparticles (polymeric micelles) that act as tumor-specific radiosensitizers to enhance the efficacy of radiotherapy.
15	Immunology	Small Molecule	**Novel STING Agonist**	We have developed novel sting agonists and one of them showed stronger inflammatory cytokines-inducing activity than that of one compound under clinical trial.We have also demonstrated that our compounds suppressed tumor growth in vivo.
16	Immunology	Peptide	**STAP-1 Therapeutic Peptide for Autoimmune disease**	We found that a STAP-1, an adapter molecule, has a novel function in the activation of immune responses by T cells and the subsequent development of autoimmune diseases. Using the STAP-1 knockout mice, we revealed that the STAP-1 suppressed T cell activation and exacerbation of autoimmune diseases and allergies. And also, we designed the STAP-1 binding inhibitory peptide, and the peptide suppressed T-cell activation and also improved clinical scores in the EAE model. Therefore, the STAP-1 peptide is expected to develop new therapeutic agents for new autoimmune diseases and allergies. Our STAP-1 binding inhibitory peptide is as well.

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17	imflammatory diseases	nucleic acid	**Meflin is involved in the development of inflammatory diseases as a novel TNF receptor ligand.**	Meflin functions as a novel ligand for TNF receptors and an activator of NF-κB. Its N-terminal fragment binds to the fourth domain of TNF receptors, and it interacts with TNFα to form a strong complex. Elevated blood levels were observed in several inflammatory diseases, while siRNA-mediated depletion suppressed disease development via NF-κB pathways. These findings support its potential as a biomarker and therapeutic target.
18	cirrhosis	Cell	**Amelioration of liver fibrosis with autologous macrophages induced by IL-34-based condition**	Macrophages derived from monocytes stimulated with IL-34 developed as a therapeutic approach for liver fibrosis. These cells demonstrated superior activity compared to CSF-1-induced macrophages in controlling fibrosis and inflammation.
19	diabetes	Small Molecule	**Resolvin E3 Derivatives: Breakthrough Therapy for Insulin-Resistant Type 2 Diabetes**	Novel indole derivatives have been synthesized as insulin resistance ameliorators and as therapeutic or preventive agents for type 2 diabetes. These compounds were designed as stable equivalents of the pro-resolving lipid mediator Resolvin E3.
20	Osteoporosis	Small Molecule	**A repurposing drug candidate that can suppress rebound bone resorption after administration of anti-RANKL antibody, a treatment for osteoporosis**	In this invention, we clarified the mechanism of rebound after administration of anti-RANKL antibody and discovered a repurposing drug candidate that can suppress rebound-induced increased bone resorption. Denosumab, an anti-RANKL antibody, is one of the effective therapeutic drugs for osteoporosis. However, discontinuation of denosumab administration is associated with a decrease in bone mineral density within 12 months after discontinuation and may cause multiple vertebral fractures, so another bone resorption inhibitor should be started 6 months after the last injection. As a treatment, bisphosphonate therapy, another bone resorption inhibitor, may alleviate the biochemical rebound phenomenon before discontinuation, but its effectiveness is not sufficient.
21	Ophthalmology	Peptide	**Novel peptides for glaucoma treatment**	BDNF (Brain-Derived Neurotrophic Factor) deficiency contributes to the onset and pathological progression of glaucoma, and approaches to treat glaucoma by promoting BDNF secretion are being investigated (PLoS One 2014 Dec 23;9(12):e115579). In our present study, researchers focused on the mechanism of BDNF secretion suppression in glaucoma pathology and identified a novel peptide with BDNF secretion-promoting function.
22	Dermatology	Small Molecule	**Anti-photoaging topical agent that can be a repurposing drug candidate for skin aging diseases including xeroderma pigmentosum and skin cancer by removing senescent cells**	We have proposed an anti-photoaging topical agent that can be a repurposing drug candidate for skin aging diseases including xeroderma pigmentosum and skin cancer by removing senescent cells. We focus on a new mechanism by which skin cancers are caused by the overproduction of inflammation-inducing Senescence-Associated Secretory Phenotype (SASP) factors from aged melanocytes (photoaged cells) that do not undergo apoptosis or cell death after exposure to UV light. The anti-photoaging topical agent can suppress inflammation by inhibiting the production of SASP factors. The strength of this medicine is that it can inhibit UV damage after UV exposure, and it can be used as a topical agent. https://pmc.ncbi.nlm.nih.gov/articles/PMC11058315/
23	Infectious diseases	Antibody	**Novel Antibodies for Marburg Virus Therapy**	We have generated neutralizing MARV-specific mAbs that neutralize MARV infection. Ten representative mAbs were produced and divided into three groups based on their putative epitopes and amino acid sequences of their variable regions of heavy and light chains. Five mAbs were cross-reactive to MARV and RAVV and most likely bind an epitope across the fusion loop and receptor binding domain of GP. The others neutralized MARV but not RAVV and likely bind to an epitope on the head region of GP. It was noted that all these mAbs showed neutralizing activity equivalent to or rather higher than a previously known neutralizing mAb MR78.
24	Infectious diseases	Antibody	**A Highly Cross-Neutralizing Antibody for Ebolavirus Therapy**	We have generated an ebolavirus glycoprotein-specific monoclonal antibody. It effectively inhibits cellular entry of representative isolates of all known ebolavirus species in vitro. It also shows its protective efficacy in mouse models of ebolavirus infections. This novel neutralizing monoclonal antibody targets a highly conserved internal fusion loop (IFL) in the glycoprotein molecule. This novel neutralizing monoclonal antibody prevents membrane fusion of the viral envelope with cellular membranes.
25	Infectious diseases	Peptide	**Novel antibacterial peptides**	Novel antibacterial peptide fragments have been identified from Nemuri (NUR), a 172-amino-acid protein originally found in Drosophila with sleep-inducing and antibacterial properties. While the full-length NUR protein showed no antibacterial activity, specific fragments were discovered that exert potent antibacterial effects. These peptides act through a mechanism distinct from existing antibiotics and may be effective against drug-resistant bacteria.
26	Diagnostics	Antibody	**Methods and kits for detecting human α-defensin HD5 and antibodies used in said methods and kits**	We have established a monoclonal antibody against HD5 as an important tool for accurately monitoring and diagnosing the intestinal environment. The purpose of this invention is to provide a simple and high-throughput method for detecting HD5 contained in biological samples (feces, serum, etc.) collected from subjects using the monoclonal antibody.
27	Medical Devices	Ultrasound Imaging	**Imaging Diagnosis of Hip Joint Disorders**	Automatic measurement and diagnosis of pediatric hip joints using dynamic ultrasound imaging. By detecting anatomical landmarks of the ilium, it identifies the baseline and acetabular line and calculates the α angle, which is useful for diagnosing developmental dysplasia of the hip (DDH). The use of bounding-box inference for landmark detection shortens processing time, making real-time video assessment of hip ultrasound examinations possible
28	Diagnostics	NGS	**Comprehensive detection method for parasites using portable NGS**	This invention enables comprehensive and easy detection of parasites, including unknown targets.To comprehensively detect parasites, portable NGS is used to obtain parasite genes with amplified gene sequences exceeding 1 kbp in length while inhibiting the amplification of host-derived gene sequences.
29	Fluorophore	Small Molecule	**Shortwave infrared fluorescent dyes for highly sensitive detection of tumors via EPR effect**	Novel indocyanine green derivatives that emit shortwave infrared fluorescence (900–1400 nm). These compounds accumulate in tumors without monoclonal antibodies or other targeting agents and are useful for high-sensitivity fluorescence imaging of cancer.
30	Protein expression	Vector	**Novel mammalian cell expression vectors capable of producing high levels of exogenous proteins**	The present invention relates to novel vectors and use thereof. More specifically, the present invention relates to mammalian cell expression vectors that impart to mammalian host cells an ability to produce high levels of foreign gene-derived proteins. The expression vectors of the present invention are particularly suitable for production of mammalian proteins that rarely exhibit adequate activity upon genetic recombination usingE. colior yeast as host and which require glycosylation and folding that are unique to mammals.
31	Peptide Technology	Peptide	**Widely applicable as a general strategy for the optimization of peptide sequences**	We developed an amino acid that allows both the search for modifiable sites in the parent peptide and the subsequent site-selective chemical modification. After peptide scanning using this amino acid,the specific ligation was performed on the alcohol present in the side chain of the amino acid residue. This made it possible to carry out scanning and chemical modification of the peptide consecutively, and also made it possible to carry out the chemical modification process on a minute scale of several hundred nmol. This enabled us to reduce the time and cost required to synthesize a large number of peptides.
32	Experimental model animals	Mice	**Method for Temporal Evaluation of Reproductive Toxicity Using Bioluminescent Imaging and Genetically Modified Mice**	This invention provides a method for the temporal and quantitative evaluation of reproductive toxicity using bioluminescent imaging (BLI). The method involves labeling a protein specifically expressed in spermatogenic cells with luciferase (a bioluminescent enzyme) and utilizing its reaction with luciferin (a bioluminescent substrate). The invention also includes genetically modified mice that are directly used in this evaluation method.