

## List of funded research projects:

- **From 2017:** Bf3R research funding - allocation of funds for scientific research projects in the field of 3R - *Replacement, Reduction and Refinement*
- **1990 - 2017:** ZEBET - research funding for the scientific development of alternative methods to animal testing

<b>Funding year 2021</b>	
173	Generation of authentic in vitro organoid models to study COVID-19 pathogenesis and immune response considering respiratory comorbidities
172	EBONERV - Investigation of Ebola virus persistence in the central nervous system using cerebral organoids, organs-on-chips and in silico modelling
171	Ultrasonic vocalizations as positive welfare indicator for laboratory mice
170	Development of an in vitro system for concentration testing of Dextran sodium sulfate as a Replacement method for in vivo testing of mice
169	Human tumor tissue slices to model the immunological tumor microenvironment
168	Development of a single-cell sequencing platform for genome-wide cancer gene discovery from micro cohorts of mice
167	Patient-derived Organoids and CAR-T cells as a preclinical platform for personalized immunotherapy of EGFRvIII positive lung cancer
166	C. elegans as a model for genotoxicity testing - new approaches in a routine field
165	Improving the validity of the fish embryotoxicity test (FET) as a replacement for the acute fish test by implementing a biotechnological metabolization system
<b>Funding year 2019</b>	
164	Detailed analysis of the intra- and inter-experimental variability of a stem-cell model for embryogenesis at a single-cell resolution
163	Aging in a dish
162	Identification of developmental neurotoxic compounds by automated assessment of changes in behaviour and morphology of the zebrafish embryo
161	Usage of lung organoids to study the pathogenesis of asthma phenotypes
160	Development of data-based simulation models of body and brain interactions to replace animal experiments in brain research
159	Reduction by simple access to Bayses analyses
158	Entwicklung eines nicht-radioaktiven Jodierungsassays zur Aktivitätsbestimmung der Thyreoperoxidase
157	Studying metabolic pathways in glomerular diseases to discover new treatment options
156	Cervix-Chip - A patient-specific Cervical Neoplasia / Carcinoma Cissue Model based on Organ-on-a-Chip Technology
<b>Funding year 2017</b>	
155	Development of in vitro methods for studying mechanisms of lung regeneration

154	Efficacy of suitable anaesthetic agents in zebrafish
153	Identification of therapeutic target molecules for Heart Failure in <i>Drosophila melanogaster</i>
152	Generation of ex vivo liver models by 3D bioprinting - physiological characterization and proof-of-concept for use in biomedical research
151	SimulRATor – A systematic evaluation of simulators of rats and mice and first time 3D printing of new prototypes as replacement and refinement to animal experiments
150	Development of an embryonal organoid system containing embryonic and extraembryonic cell types
149	Development of an immunocompetent in vitro wound healing model
148	Porcine Lungs from the Slaughtering Process as a Model for Ex Vivo Lung Perfusion (EVLP)
<b>Funding year 2015</b>	
147	Establishment of an alveolar model to study toxicologically and microbially induced acute respiratory failure
146	In vitro toxicology: a new methodology for observing metabolic pathways in 3-dimensional cell culture models
145	In vitro translation of organotoxic metabolic biomarkers of liver failure from clinical and experimental samples
144	Optimization of pain management in the mouse osteotomy model - integration of refinement studies in a basic science study.
143	In vitro cell culture models of the human blood-retinal barrier for pharmacokinetic and toxicological evaluation of drugs
142	3D for 3R: 3D models as an alternative method to animal testing for establishing and learning a standardized intranasal application
141	Predictive cardiotoxicity testing based on human stem cell derived cardiomyocytes
<b>Funding year 2013</b>	
140	Development of a microfluidic multi-chamber chip suitable for tissue spheroids with integrated sensor technology for real-time measurement of physiological cell parameters
139	Establishment and evaluation of an in vitro test method to study polymicrobial-induced liver dysfunction using a microfluidic BioChip system
138	Development of a non-animal test method for testing the prospective toxicity of substances on fertility using transgenic lines of the medaka ( <i>Oryzias latipes</i> )
137	Testing of diphtheria, tetanus and pertussis components in the guinea pig - An approach to reduce animal testing for government batch testing of multicomponent vaccines
136	Cell culture models of human nasal mucosa for in vitro determination of nasal drug absorption (project that was continued)
135	Endocrine disruptor risk evaluation in vivo using transgenic zebrafish larvae Real-time measurement of glucocorticoid signaling/synthesis and generation of a multi-reporter fish for glucocorticoid, estrogen and thyroid hormone signalling

134	Establishment of an in vitro alternative method for certification of antiprotozoal disinfectants
133	Establishment of retina long-term cultures as alternative method to animal testing
<b>Funding year 2011</b>	
132	Identification of electrophysiological endpoints in stem cell-based developmental neurotoxicity (DNT) assays
131	Selection and testing of antibodies for quantitative analysis of specific activation of the TGF-beta growth factor signaling pathway for toxicity profiling
130	Controlled cryopreservation for storage and transport of human organotypic corneal equivalents for in vitro drug absorption studies as a substitute for excised corneas from experimental animals (subproject)
129	Evaluation of optimal transport conditions for the shipment of human organotypic corneal equivalents for in vitro drug absorption studies as a substitute for excised corneas from experimental animals (subproject)
128	Development of an ontology to classify the severity of animal testing procedures according to Annex VIII of the European Directive 2010/63/EU (Subproject 4)
127	Development of an ontology to classify the severity of animal testing procedures according to Annex VIII of the European Directive 2010/63/EU (Subproject 3)
126	Development of an ontology for the classification of the severity of animal testing procedures according to Anh. VIII of the European Directive 2010/63/EU (Subproject 2)
125	Development of an ontology for the classification of the severity of animal testing procedures according to Anh. VIII of the European Directive 2010/63/EU (Subproject 1)
124	Establishment of a microscopy-based high-throughput method for the assessment of toxicological effects of nanomaterials as an alternative test method
123	Conditional immortalization of alveolar epithelial cells to establish in vitro models relevant for infection; short title CILIA (conditional immortalization of alveolar epithelial cells)
122	In-laboratory validation of primary porcine oviduct epithelial cell cultures for basic reproductive biology research and reproductive toxicology screening
121	Refinement methods to reduce laboratory animal suffering: An investigation into Refinement methods based on German biomedical and animal research applications from 2010
120	Establishment of a stem cell-based approach for systematic testing of negative side effects of drugs on human cardiac myocytes
119	Integration of artificial blood vessel tissues into microfluidics and validation of in vitro functionality
118	Organotypic cell culture models of human nasal mucosa as an alternative method to animal testing for in vitro determination of nasal drug absorption
117	Modulation of signal transduction as a marker for toxic effects in tissue-specific cell cultures (TOX signaling chip)

<b>Funding year 2009</b>	
116	Development of an in vitro method to determine the efficacy of botulinum toxin A
115	Characterization of the effect of teratogenic agents on essential signaling cascades in differentiating mouse embryonic stem cells by "phosphoprotein profiling"
114	Comparison of different killing procedures with inhalation narcotics in terms of stress reduction in laboratory rodents
113	Advanced development of the LCSA to include a specific T-cell response
112	Development of a single-cell model of adult cardiomyocytes as an alternative method to animal testing - Optical measurements of excitation-contraction coupling under the influence of test substances
111	HPCT-1E3 cells as a potential in vitro model for hepatocytes. (Extended Pre Validation Study)
110	Application of fluorescence microscopy for the advanced development of an industrially applicable in-vivo screening assay as an alternative method to animal testing for the toxicological (risk) evaluation of environmental pollutants, pharmaceutical agents, food and feed contaminants
109	Replacement of transgenic animal models for identification of mutations in vivo by refining regulatory required animal studies with the <i>Random Mutation Capture</i> assay technique
108	Studies on human organotypic corneal equivalents and its use for in vitro permeation and metabolization studies as a substitute for excised corneas from laboratory animals in the course of regulatory approval procedures
107	Knowledge-based Search Engine for Alternative Methods to Animal Experiments
<b>Funding year 2006</b>	
106	Investigation of anti-oxidative responses of lung cells as an endpoint for assessing the toxic potential of aerosols after exposure at the air-liquid interface
105	Work on the Registry of Cytotoxicity database and development of a new Registry of Cytotoxicity 5 database (RC5_DB.mdb)
104	Establishment of normal human neural progenitor cells as an in vitro screening model for the evaluation of the neurotoxic potential of chemicals
103	Electroprecipitation of medical aerosols on epithelial cell monolayers to predict pulmonary drug absorption as an alternative method to animal testing in early phase ADME screening
102	Preparation for external prevalidation: optimization of the internally validated and standardized method for quantification of angiogenesis and anti-angiogenesis in vitro by determining the 'angiogenic standard' of the cell culture to be used
101	Development of a single-cell model of adult cardiomyocytes as an alternative method to animal testing - Optical measurements of excitation-contraction coupling under the influence of test substances
100	Equine precision lung slices as an in vitro model of obstructive airway disease for identification of potential therapeutic targets and characterization of drug effects
099	Alternatives to animal testing (mouse inoculation test) to measure the efficacy of vaccines against rabies
098	Advanced development of the LCSA (loose-fit coculture based sensitization assay)

097	Knowledge-based Search Engine for Alternative Methods to Animal Experiments
096	Risk assessment of substances by spatial multimarker profiling of 3D tissue cultures
<b>Funding year 2004</b>	
095	Optimization of mouse mutant cryopreservation
094	Gastritic cell lines as a substitute for native gastric gland cells for the study of acid secretion with special reference to preclinical studies
093	Evaluation of alternative and complementary methods to animal experiments in experimental biomedicine
092	IC50 search index chemicals with IC50 values that are not recorded in the RC database
091	Prevalidation of a corneal model developed on the basis of immortalized human corneal cell lines as an in vitro alternative to the Draize eye irritation test
090	Development of bioreactors for in vitro testing of biological heart valves to reduce animal testing
089	In vitro exposure of lung cells to aerosol at the air-liquid interface as an alternative for animal inhalation experiments
088	Optical probe technique for cytostatic drug resistance profiling in 3 dimensional in vitro tumor cells
087	Characterization and prevalidation of a new human corneal model for oculotoxic safety testing
086	Development and validation of an inductive database for predicting carcinogenic effects of chemicals
085	Normal human neural progenitor cells as a screening model for developmental neurotoxic agents
084	Computer-based risk assessment of dermal drug uptake
083	Development of an in vitro model for testing wound healing-influencing substances based on skin tissue culture from slaughter animal skin
082	The isolated perfused bovine udder as an in vitro model for characterizing the sensitization potential of chemicals
081	"HPCT-1E3 hepatocytoma cultures to determine cytotoxicity; toxicokinetic interaction potential and cholestatic effects; pre-validation study."
<b>Funding year 2002</b>	
080	Studies on the suitability of biotechnologically derived skin models for cutaneous absorption of differently formulated steroid hormones
079	Development of methods for the isolation and analysis of yessotoxin
078	Advanced development and mathematical testing of a model for 3 D computer simulation of drug distribution in inner ear fluids during local pharmaceutical application
077	RNAi technology in mammalian cells as an alternative to knock-out mice: functional studies of proteins of the Myc-Miz-1-TopBP1 network
076	Transgenic Animals - Situation in Germany and Perspectives for Alternative Methods

075	HET-CAM-TEST for biocompatibility testing of orthopedic surgical implants and intra-articular irrigation solutions
<b>Funding year 2000</b>	
074	Development of a computer program for biometric validation of the ATC method
073	An in vitro molecular differentiation assay to evaluate the teratogenic potency of selected exogenous compound classes: Pathways for automation and testing of new compounds
072	Construction and characterization of V79 Pathway Cell Lines™: Heterologous co-expression of human cytochrome P450 1A2 and polymorphic forms of human N-acetyltransferase type2 in V79 Chinese hamster cells for in vitro investigation of toxicity and metabolism of chemicals and drugs
071	Development and prevalidation of in vitro methods as alternatives to the Draize eye irritation test using quantitative fluorescence scanning microscopy (QFSM)
070	Establishment of a cell culture model (primary cell cultures of arterial human smooth muscle cells)
069	In vitro breeding of <i>Pediculus humanus corporis</i> , the human clothes louse - an animal welfare alternative to breeding by means of rabbits
068	3-D computer simulation of drug distribution in inner ear fluids during local pharmaceutical application
067	Development of a dynamic in vitro co-culture model of the blood-brain barrier to substitute for long-term permeability studies in animals
066	The isolated hemoperfused bovine uterus as an in vitro inflammatory model for testing antiphlogistically active pharmaceuticals
065	In vitro detection of sensitization to allergens on passively sensitized human keratinocytes; prediction of allergenic potential of test substances
064	Characterization of a yolk factor (EYF-X) with growth stimulating properties in in vitro cell cultures. Replacement of fetal calf serum (FCS) by EYF-X
063	Evaluation of 144 alternative and complementary methods to animal experiments in experimental biomedicine
062	The Registry of Cytotoxicity Parts 1 to 3 (RC 123) - Final processing of data for inclusion in the RC database
061	Implementation of a computer program for quantitative assessment of phototoxicity of chemical substances
060	Regulation of the immunological response of human sebaceous gland cells (SZ95 cell line) in vitro
<b>Funding year 1998</b>	
059	Evaluation of 240 alternative and complementary methods to animal experiments in experimental biomedicine
058	Normothermic hemoperfusion of isolated organs from slaughter pigs as an alternative method to animal testing
057	The evaluation of three-dimensional human hepatocyte cultures for the study of drug metabolism and toxicity as an alternative to animal testing
056	In vitro model for angiogenesis and antiangiogenesis

055	Development and validation of an in vitro assay system to determine the permeability of drug substances across the alveolar epithelium based on human alveolar epithelial cell monolayer
054	Reconstructed skin as an alternative model to determine drug/substance penetration. Prediction possibility for the invasion of dermally applied substances in vivo
053	Biologically active factors from egg yolk as an alternative to fetal calf serum as an additive for in vitro culture media
052	Organotypic hippocampal cultures from juvenile rats as an in vitro model for the study of protective pharmaceuticals in stroke
051	The Registry of Cytotoxicity Parts 1 to 3 (RC 1, 2, 3) - Studies on specific issues of the relationship between in vitro and in vivo toxicity
050	Development of an in vitro assay for predicting the occurrence of skin irritation in humans
049	An in vitro molecular differentiation assay to evaluate the teratogenic potency of selected exogenous compound classes
048	Arteriosclerosis and sex hormones - Establishment of an organ culture model as an alternative or complementary method to animal testing (White New Zealand rabbit).
047	Evaluation of 40 alternative and complementary methods to animal experiments in experimental biomedicine (continued).
<b>Funding year 1996</b>	
046	Evaluation of 40 alternative and supplementary methods to animal experiments in experimental biomedicine
045	Standardization of SHE cell cultivation to minimize batch and passage variability for potential routine use in chemical and drug regulatory affairs Part I and Part II
044	Studies on long-term cultivation of tumors from human fresh biopsies on chorioallantoic membrane on incubated chicken egg (CAM) as a substitute for in vivo cultivation in nude mice
043	Embryotoxicological studies of cardiac cell development: reporter genes to identify ES cell-derived cardiomyocytes
042	Use of sheep seminal vesicle cell cultures for testing antiphlogistic drugs and xenobiotics and their effect on prostaglandin synthesis
<b>Funding year 1994</b>	
041	Testing of biomaterials for skin penetration in cell and skin cultures
040	Establishment of a cultivation system for an autologous tumor/native tissue system on the chorion allantoic membrane of the incubated chicken egg (CAM) to replace corresponding experiments on the nude mouse - Part 2 -
039	Pyrogen testing in a human whole blood model
038	Replacement of pharmacatests to affect leukocyte migration in animal experiments by an organ-like capillary blood vessel in vitro. - Part I and II -

037	A new in vitro method for estimating the teratogenic potential of valproic acid analogues: Interaction with the peroxisome proliferator-activated receptor (PPAR) in different cell cultures of animal and human origin
036	Cell bioreactor as an alternative to animal experiments - validation study on a new liver cell culture model
035	Improvement of the barrier function of artificial skin models - Part I and II -
034	Mouse Ovarian Follicle Culture: A Unique In Vitro Ovarian Toxicant Bioassay, An Alternative To In Vivo Testing
033	Investigation of dermal absorption including parameters of skin tolerance in an in vitro model (isolated perfused bovine udder)
032	Assessment of the in vivo predictivity of selected in vitro test systems of the 'EC/HO International Validation Study on Alternatives to the Draize Eye Irritation Test for the Classification and Labelling of Chemicals' using statistical methods and mathematical models
031	Validation of an in vitro organotypic model of the liver for predictive analysis of hepatic in vivo drug metabolism
030	Evaluation of the pollen tube growth inhibition test (PTG test) as a possible replacement method for the fish test according to DIN 38412 part 31
029	Establishment of a cultivation system for an autologous tumor/native tissue system on the chorion allantoic membrane of the incubated chicken egg (CAM) to replace corresponding experiments on the nude mouse - Part 1 -
028	Development of biometric methods for the validation of in vitro phototoxicity tests
<b>Funding year 1992</b>	
027	Establishment of organotypic in vitro long-term cultures of human immunocompetent tissues for immunotoxicology
026	Rumen epithelial cells in primary culture: model to characterize feeding-dependent proliferation processes
025	In vitro studies on the pathophysiology and therapy of heart failure avoiding animal experiments
024	Studies on the isolated perfused bovine udder: an in vitro model for dermal penetration studies
023	Heterologous expression of hormone receptors as a screening model for receptor-acting drugs
022	Alternatives to animal testing with embryonic stem cells (ESC) in studies of embryotoxicity and developmental expression of ion channels in mammalian cells
021	Development of an in vitro screening model using permanent tumor cell lines to predict inversion of nonsteroidal anti-inflammatory drugs of the 2-APA type
020	Use of urinary bladder epithelial cell cultures for a carcinogenicity screening of aromatic amines
019	Testing of the INTERACT system as an audiovisual substitute for animal testing in the classroom
018	Human liver cells as a model for organ failure in septic shock

017	Testing of biomaterials for skin penetrations in keratinocyte cell cultures as an alternative to animal testing
016	Drug metabolism studies to test a hybrid hepatocellular perfusion system
<b>Funding year 1990</b>	
015	Development of differential screening methods for the detection of genetically engineered antibodies
014	Extension and improvement of micronucleus test on SHE cells in vitro by using supravital UV microscopy
013	Use of spontaneously pulsating cardiac myocytes derived from pluripotent embryonic stem cells in vitro for screening of cardiac-active pharmaceuticals
012	Alternatives to animal testing: In vitro bioassay for calcitonin - replacement for the in vivo hypocalcemia assay
011	Videomicroscopic measuring methods for the detection of the effect of pollutant loads
010	Specific binding of VPA analogues to embryonic proteins as a correlate of teratogenic potency: novel electrophoretic and chromatographic methods for teratogenicity testing in vitro
009	Investigation of the structure specificity of binding of teratogenic substances to embryonic proteins
008	Genetic engineering of V79 hamster cells for stable expression of xenobiotic-metabolizing enzymes and their application in metabolism and mutagenicity studies of xenobiotics and pharmaceuticals
007	Studies on the validation of a fish cell culture test as a supplementary and replacement method to the acute fish test with golden orfes
006	Validation of the R1 cytotoxicity test according to Prof. Ahne as an complementary / alternative method to animal testing the fish test in accordance with the Wastewater Levy Act
005	Macrovalidation of methods to replace the Draize test (NR/KB test HET CAM test and isolated bovine eye)
004	Investigation of new synthesis of shock proteins in isolated myocytes, isolated hepatocytes and isolated glomeruli in vitro as an indicator of toxic effects
003	Analysis of serological immune response against porcine Erysipelothrix rhusiopathiae bacteria as an alternative test of porcine erysipelas vaccines
002	Studies on the mode of action and safety of cardiovascular active pharmaceuticals on human surgical specimens.
001	Ways to estimate acute toxicity (LD <sub>50</sub> ) from cytotoxicity (IC <sub>50</sub> ) data