

What topics are we interested in publishing in *Experimental Biology and Medicine*?

The Anatomy/Pathology section invites reports of original research that provide novel insights integrating structure and function with regard to biology and medicine. A primary goal is to attract hypothesis-driven or discovery-based investigations that focus on - and test - mechanistic or fundamental questions involving human or animal anatomical structures. For example, studies that correlate cellular and molecular biology with basic or pathological anatomy with accompanying biochemical, pharmacological and or behavioral analyses to support functional significance are invited. Quantitative rather than descriptive, qualitative evidence is preferred, and data need to be evaluated by rigorous statistical methodology. Authors should keep in mind that scientific merit and clear communication will be primary factors evaluated by the referees. Of particular interest to this section are papers that relate research findings to the normal and abnormal human condition including translational research using human cells and tissues, as well as models (single cells or multicellular organisms) of human disease. Manuscripts only reporting new techniques or application of techniques to new areas are discouraged, as are descriptive studies or case reports.

The Artificial Intelligence/Machine Learning Applications to Biomedical Research section

invites high quality manuscripts of original research and review articles on applications of artificial intelligence including machine learning and deep learning in biomedical research. A primary goal is to accelerate and promote applications of both the state-of-the-art and emerging machine learning and deep learning techniques to advance biomedical research. Original research articles on development of new algorithms, software tools, and infrastructures of machine learning and deep learning for effectively answering scientific questions in biomedical research are the focus. Original research articles that describe applications of the state-of-the-art machine learning and deep learning algorithms and software tools to address specific scientific questions in biomedical research are welcome. Comprehensive and minireview articles summarizing the progress of machine learning and deep learning as well as their applications in a broad or narrow field in biomedical research are particular interest to this section. This section also publishes brief communications reporting new databases and data sources that can facilitate development and applications of machine learning and deep learning models in biomedical research. Scientific merit and technical soundness will be the major metrics in evaluating manuscripts. The effective communication of experimental methods and results including originality, clarity, quality and accuracy of the text, figures and tables is important to editorial decisions.

The Biochemistry and Molecular Biology section seeks manuscripts describing original research and minireviews that will make novel and substantive contributions to elucidating the molecular and cellular basis and/or mechanisms of cell function or disease. There are a number of areas of particular interest. One is in the rapidly expanding field of non-coding RNAs. Studies are sought on long non-coding RNAs (lncRNA), microRNAs (miRNA), small interfering RNAs (siRNA) and circular RNAs (circRNA), their role and mechanism of action in many cellular processes such as gene and epigenetic regulation, chromatin dynamics, endoplasmic reticulum stress, apoptosis, cell proliferation and migration; their important role in various disease processes such as cancer development, progression and metastasis; and their therapeutic potential and use as biomarkers for diagnosis of diseases. Another area of specific interest is in studies which will advance our knowledge and provide new insights on proteins associated with the nucleoskeleton and cytoskeleton such as tubulin, lamin, actin, myosin, and spectrin, on their interactions with each other, with the LINC (linker of nucleoskeleton and cytoskeleton) complex

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in mediating signaling between the nucleus and cytoplasm and in regulation of multiple cytoplasmic and nuclear processes. Of importance are new developments on how, mechanistically, defects or deficiencies in these proteins affect nuclear movement and architecture, cellular migration, mitosis, cell adhesion, cell-cell contact, and biomechanical functions of the cell, and lead to diverse pathological processes such as the laminopathies, DNA repair disorders, cancer invasion and metastasis, pathological cardiac remodeling, and impaired wound healing. Another area of specific interest is research on new advances in the fields of DNA repair and genomic instability, on the proteins associated with the repair processes and their mechanism of action, on the importance of these proteins in chromosome stability and telomere function, and the disorders associated with defects or deficiencies in these proteins. These are examples of specific areas of interest but are neither exhaustive nor mutually exclusive. It is important that the manuscripts submitted are well written. EBM is a multidisciplinary journal; therefore, the central points need to be clearly communicated and their impact stressed. Rigorous statistical analysis of the data must be carried out. The quality and clarity of figures and tables is also important.

The Bioimaging section invites original manuscripts and review papers in all fields of biomedical imaging including the development and applications of novel technologies for molecular, metabolic, ultrastructural, anatomical, and functional imaging of human and animals. Areas of interest encompass from whole organism, to tissues and cells, particularly including research in the field of morphological and functional mapping of the brain of human and animals with X-ray computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), transcranial magnetic stimulation (TMS), magnetoencephalography (MEG), electroencephalogram mapping, ultrasound imaging, photoacoustic imaging, optical coherence tomography, multiphoton microscopy, and other emerging technologies. Papers that focus on the investigations and studies in the following subjects and fields are welcome: (1) Investigation of the morphological and functional architecture of single organs, tissues, and cells that provide novel and interesting results on the relation between structure, and function either in physiological or pathological conditions; (2) novel non-invasive methodologies for the investigation of single organs, tissues, and cells with potential applications in the diagnostic or therapeutic domain; (3) research that combines multiple investigative approaches, such as genetics and imaging, or imaging with pharmacological probes; (4) studies on the *in vivo* imaging of the molecular mechanisms that underlie cognition and mental activity in healthy conditions as well as in the presence of neurological and psychiatric disorders and of the effects of pharmacological and non-pharmacological treatments. Manuscripts will be reviewed on the basis of scientific merit and respect of internationally accepted ethical standards for animal and human research. Submission of purely clinical studies is discouraged. Single case reports will be considered only if they may represent a significant advancement in the comprehension of pathophysiological mechanisms

The Biomedical Engineering section aims to publish original research articles and minireviews that integrate novel engineering methods with biology and medicine. Such examples include novel nanotechnology platforms for biosensing, imaging disease-specific biomarkers, and therapeutic delivery; advanced imaging technology (e.g. MRI, PET) for quantitative analysis of pathophysiology; novel biomaterial scaffold and controlled release technology for tissue engineering applications; and integrated imaging and therapeutic systems (Theranostics) for image-guided therapy. Interdisciplinary approaches bridging engineering sciences with biology and medicine are strongly endorsed, and there is reduced interest in traditional, well-defined areas of research (e.g. biomedical transducers) unless unique designs that will lead to unprecedented biological discoveries are evident. For minireviews, we strongly encourage thought leaders in the field to discuss future opportunities in the emerging key

technologies, and how they may benefit biology and medicine. For original research articles, we emphasize the scientific merit as well as the artistic presentation for effective communication of the scientific data.

The Bionanoscience section is a forum for original research and minireviews on topics at the interface between nanotechnology and the biological or medical sciences: Nanotechnology is broadly defined as research and technology development at the atomic, molecular, or macromolecular levels in the length scale of approximately 1-100 nanometer range. Of particular interest are manuscripts describing synthetic or natural nanostructures that have innovative applications in the treatment or diagnosis of disease or in the advancement of basic biological research. This encompasses topics in the field of nanomedicine. While no less important, the development and application of medical devices and instrumentation involving nanotechnology is not emphasized in the Bionanoscience section and manuscripts in this area might be suited for the Biomedical Engineering section.

The Cell and Developmental Biology section welcomes manuscripts that encompass mechanisms which regulate cellular structure and activity, particularly as they relate to developmental processes. Examples of developmental processes include control of early embryogenesis and mechanisms that determine cellular lineage and fate. The use of model lower organisms such as yeast, *Drosophila* and *Caenorhabditis elegans* are most welcome, as are vertebrate models of differentiation and development. Manuscripts that elucidate basic developmental mechanism(s) which are then evaluated using *in vivo* systems are encouraged. At the cellular level, the Cell and Development section will entertain manuscripts that examine basic mechanisms of cellular activity such as regulation of cell division, cell cycle, cellular responses to DNA damage, cell polarity, adhesion, and migration. Manuscripts that use single cell analyses of nucleic acids and proteins that provide insight into cellular and developmental mechanisms are also welcome. The above examples represent the types of research areas that will be considered by this section, but the list should not be considered as all inclusive.

The Clinical Trials section invites original research or minireview articles describing research conducted in human-subjects. Publications in this section may include reports from first-in-human research, other Phase I research, or Phase II, III, or IV research. In addition to interventional trials, the section invites population-based studies including prospective or retrospective observational studies. Original research detailing study design or trials in progress are also welcome. Biomarker based research is appropriate if biospecimens were collected from or directly relating to treatment of patients. Meta-analysis studies, or review articles focusing on clinical trials data are also welcome. Original research manuscripts are expected to be of high scientific merit, but not limited to “positive” versus “negative” trial results. Minireviews are expected to be a comprehensive treatment of a clinical trials topic, and both meta-analyses or high-quality descriptive reviews will be accepted.

The Endocrinology and Nutrition section welcomes the receipt of highly impactful manuscripts on any topic relevant to endocrinology or nutrition. Of particular interest are original research articles and timely reviews on topics that would be of widespread interest. In the field of endocrinology, we welcome novel findings related to the actions of hormones on their target tissues and new findings related to clinical endocrine disorders. These include but are not limited to findings regarding hormone receptors and their signaling pathways, developmental changes in endocrine function, identification or clarification of hormone functions, targeted deletions of genes important to endocrine function, and nutritional factors impacting endocrine function and diseases of the endocrine system. In the area of nutrition, original manuscripts on metabolism, nutrigenomics, nutritional biochemistry, food safety, clinical

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nutrition, nutritional impacts upon the risk of developing or the treatment of specific diseases (e.g., cancer, diabetes, Alzheimer's disease), the microbiome, and nutrition/aging/health are particularly welcomed. However, there will be reduced interest in articles addressing eating disorders, food policy, and sports nutrition.

The Environmental Health/Biomarkers/Precision Medicine section invites reports of original research articles and minireviews that provide novel information on biomarkers with an emphasis on their impact on precision medicine. A primary goal is to identify and examine biomarkers of effect, disposition and susceptibility that prove useful in assessing the safety and efficacy of drugs and biologics as well as the safety of food. Investigations focused on technologies enabling precision medicine in clinical application and biomarker qualification are especially relevant to the drug development process and are welcomed for submission to this section. Submitted manuscripts may include information on the development of innovative biomarkers for application to clinical assessments and to medical product development as well as those relevant to other scientific areas concerning product safety (e.g., foods and devices). The goal is to accelerate development, refinement, and precision application of medical products; assess the safety of food; and provide information on the toxicity of tobacco products. For the reviews, we strongly encourage thought leaders in the biomarker field to discuss emerging and mature biomarkers as they travel the development and qualification process and how they may benefit public health. For original research articles, scientific merit will be emphasized as well as the effective communication of the scientific data including clarity, quality and accuracy of the text, figures and tables, and clarity of methods, experimental design, and statistical analyses.

The Genomics, Proteomics and Bioinformatics section invites original research papers and minireview articles in genetics, genomics, epigenomics, metagenomics, proteomics, metabolomics, and related areas of bioinformatics. We are also interested in contributions that describe new workflows and methods of data processing, analysis, diagnosis, and integration across scales – from sequence variants to clinical, social and economic impact.

The Immunology/Microbiology/Virology section has a broad remit and welcomes the receipt of manuscripts reporting novel research findings and minireviews on each of these aspects of experimental biology and medicine. Studies with clear translational relevance are particularly encouraged, such as investigations of bacterial/viral diseases, cancer immunology, transplantation medicine, autoimmunity, allergy, development of vaccination strategies and novel immunotherapies. There is reduced interest in articles on fundamental topics such as the taxonomy of microorganisms, unless innovative research tools and concepts are employed to address previously intractable questions. While emphasizing the importance of scientific content (quality and novelty), our editorial policy recognizes the importance of clear and lucid presentations as reflected in the eloquence of the scientific language and the clarity and quality of the figures used for data or conceptual presentations.

The Mechanisms of Aging section welcomes original research and minireviews covering a broad aspect of aging research from the basic to applied science, including human translational (clinical) studies. We are particularly interested in studies investigating the mechanism of aging using human samples as well as model organisms (from unicellular organism to vertebrate and non-vertebrate organisms). Studies using *in vitro* (cell culture) system are also welcome. The broad definition of the mechanism of aging includes (1) the mechanism of lifespan determination, (2) the mechanism of age-dependent alteration of cellular- or/and tissue-function, and (3) the mechanism of age-dependent onset/progression of diseases. This section also welcomes the reports investigating interventions in aging and age-dependent diseases as these

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studies provide new insights regarding the aging mechanism. We will consider various types of study methods including biochemistry, molecular biology, cell biology, genetics, pathology, nutrition science, sports medicine, proteomics, genomics, metabolomics, biostatistics, theoretical model analysis and other scientific approaches investigating the mechanism of aging and lifespan determination.

The Neuroscience section welcomes reports on original, high quality, research in neuroscience that provide new fundamental insights into the workings of the nervous system in health and disease. A primary area of interest is hypothesis driven research that seeks to identify fundamental questions about how the nervous system develops, maintains homeostasis, contributes to sensory and motor information processing and control, performs higher cognitive functions, and the processes that underlie these functions. Examples of underlying processes include: regulation of gene expression by cells of the nervous system; neurovascular coupling; synaptic and membrane function; properties of networks of neurons and glia; learning and memory; intra- and intercellular signaling; and the interaction of these processes in the nervous system with other systems such as the cardiovascular, endocrine and immune systems, as well as in metabolic control and homeostasis. Studies on the effects of aging and a wide variety of neurological and psychiatric diseases on these processes, including the identification of new potentially therapeutic targets and processes, as well as the delineation of mechanisms for novel diagnostic approaches are of interest. In addition to such hypothesis driven research, original studies that are discovery based, including screens and identification of molecular components of these processes and diseases, if framed within the context of fundamental questions about nervous system development, function and dysfunction are also welcome. Studies of the effects of incompletely characterized compounds or mixtures of substances on nervous system development or function, whether natural or synthetic are not appropriate. Likewise, studies that are primarily targeted at additional uses of clinical procedures are not appropriate.

The Pharmacology and Toxicology section covers a wide range of topics and this section strives to reflect that diversity. The section will emphasize original work and minireviews that elucidate drug mechanisms or unusual drug responses which contribute significant knowledge to pharmacology or toxicology. Submissions are expected to meet the standards of pharmacological investigation. For example, manuscripts should include dose-response analysis, rather than using a single dose, and seek to demonstrate cause and effect relationships, rather than only presenting correlational findings. Appropriate control groups, such as drug vehicle-treated and drug-exposed normal groups, should be included. While manuscripts in all areas of pharmacology are welcomed, studies on herbal medicines or plant extracts with unknown components or mixtures of active ingredients are generally not appropriate unless exceptional new activity has been discovered. Manuscripts reporting a known drug action on previously unstudied cells or tissue are generally also not appropriate without strong justification of the importance of the study.

The Physiology and Pathophysiology section welcomes high-quality manuscripts reporting innovative studies that address normal function and/or impact of diseases and treatments on whole organisms, organ systems, organs, cells, organelles, membranes, and biomolecules. Reviews of current topics of interest within the broad scope of physiology and pathophysiology also are welcomed. Examples of topics that fall within this section's scope include: membrane ion transport and electrophysiology; autonomic control of internal organs; neuro-hormonal signaling mechanisms and their impact on cells and organs; adaptation and maladaptation of internal organs to environmental stresses; mechanisms of ischemic or inflammatory injury of internal organs and novel strategies to prevent such injury; mitochondrial support of cellular

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function and mediation of cell death vs. survival; physiological regulation of glomerular filtration and renal tubular electrolyte transport; neuroendocrine mechanisms of hypertension; mechanisms of excitotoxicity in brain neurons and its treatment; integrated regulation of cardiopulmonary function during exercise or hypoxia; and the impact of diabetes, volume and electrolyte disorders, immune dysfunction and other disease processes on internal organs, their constituent cells and their functions. The criteria for evaluating manuscripts are: novelty and potential impact of the work; clarity, quality, accuracy and originality of the text, figures and tables; how effectively the methods, experimental design and statistical analyses address the hypotheses; and how well the results support the conclusions.

The Stem Cell Biology section seeks original articles and minireviews that describe fundamental investigations in the rapidly expanding field of stem cell biology. Manuscripts on all aspects of stem cell biology are welcome, including mechanistic studies of embryonic stem cells; the reprogramming of cell fates; studies of mechanisms involved in regulating the differentiation stem cells towards specific cell fates; the developmental biology of tissue-specific stem and/or progenitor cells; the epigenetics, genomics and proteomics of stem cells, and the biology of cancer stem cells. We also welcome manuscripts that establish novel paradigms for clinical translation of cell-based therapies involving the use of stem cells. Only those manuscripts that are well designed and written, provide significant new insights, and explore a topic in-depth will be published. Manuscripts that report novel and significant findings will be given preference over confirmatory studies.

The Structural Biology section seeks original articles that address fundamental aspects of structural biology, which lead to either a better understanding of the functional/mechanistic properties of biologically important macromolecules or provide insight into pharmacological regulation of potential therapeutic targets. Manuscripts in this section will typically couple structural findings with additional experimental evidence (both - *in vitro* or *in vivo*) to support the conclusions made in the manuscript. EBM recognizes that structural biology is a diverse field and will welcome manuscripts that use various techniques, including but not limited to, X-ray crystallography, NMR, SAXS and Cryo-EM. If necessary, authors will be required to deposit coordinates to publically available databases (e.g. Protein Data Bank) and obtain an accession code. To support the quality of the structural information, authors are encouraged to include validation reports when applicable. Manuscripts can include either high or low-resolution structural studies. Manuscripts that include molecular characterization of mechanisms using a variety of techniques are also acceptable. For example, coupling biophysical characterization with mutational analysis to define macromolecular assemblies. Submissions that are limited in scope to a single technique without supporting results are better suited for a different journal. This section will not accept manuscripts that are purely computational. However computational biology that supplements the structural findings is acceptable. Since EBM is a diverse journal with a broad readership, manuscripts should be written for a diverse audience. Authors are encouraged to design figures to properly convey their structural results for a general audience. For minireviews we encourage leaders in the field to discuss recent structural advances in their respective field and discuss future areas of exploration or areas that could benefit from a better molecular understanding.

The Synthetic Biology section aims to publish both original high-quality research articles and minireviews in the subject area of synthetic biology, broadly defined. Synthetic biology can be summarized as a field of research dedicated to the design of biological parts, systems, and devices across multiple length scales. We look forward to receiving manuscripts that either: (i) report engineering biology that can ultimately be used in industrial/technological/medicinal applications, (ii) exploit an “understanding by building” approach as a tool to increase our

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understanding of fundamental processes in nature, and/or (iii) provide insights into questions relating to the origins of life, and how molecular building blocks come together to enable life. Articles concerning both top-down and bottom-up approaches will be considered. Examples include metabolic engineering, biomolecular engineering, cell-free synthetic biology, bacterial/mammalian/plant synthetic biology, artificial cells, in vitro cell models, computational/modelling approaches, novel techniques, enabling technologies etc. Interdisciplinary submissions bridging the divide between the engineering, physical and life sciences are strongly encouraged.

The Systems Biology and MicroPhysiological Systems section recognizes both the breadth and complexity of biology, the need to strengthen the ties between biology, medicine, engineering and the physical sciences, the challenges of spanning both basic research and clinical medicine, and the opportunities presented by organs-on-chips and the microphysiological systems they enable. This section seeks manuscripts describing original research and minireviews that span multiple disciplines, provide new interdisciplinary perspectives to challenging problems, involve the application of new tools and techniques to biology and medicine, or the application of organs-on-chips and tissue chips to problems in systems biology, pharmacology, physiology, and toxicology. The desired focus of articles is that they are informative to all audiences within EBM and are not directed solely towards narrow topics in either biology, medicine, or physiology. This section serves as a venue where biologists and physicians can learn about the application of new technologies to biological or clinical problems, with a biology content that is more than just proof-of-concept of a new tool, as might be expected by a device- or instrument-oriented specialty journal. Similarly, engineers and physical scientists should view this section as a source of information on practical, even clinical, needs of systems biology and integrative physiology. We seek minireviews of the breadth of approaches to either a practical problem, such as the many means to measure cellular mechanical forces developed by living cells *in vitro*, or an in-depth discussion of a systems-physiology problem that has yet to be explored by physical scientists and engineers, for example, the complexity of how metabolism of a drug or toxin by one organ might affect other organs. Ideally, this section will serve as a meeting place for biologists, physicians, engineers, and physical scientists to join together to explore the intersections of their core disciplines – an intersection best described as systems biology. As shown on the cover of this journal, systems biology and microphysiological systems together should advance the closing of the hermeneutic circle of biology, wherein knowledge of the whole informs our understanding of the parts, and where knowledge of the parts increases our understanding of the whole.

The Translational Research section is interested in research that connects or moves the study in one discipline to another. Particularly for biomedicine, translational research is the research that relates basic and clinical research to medical or industrial application. As such, it includes a wide range of biological, medical, chemical, pharmacological, engineering, and computational studies that aim at elucidating the mechanism of a biological or disease related pathological function/process, or applying such mechanistic understanding to the generation of new knowledge/strategies with clinical or industrial implication. We are interested in publishing original and high-quality research that meets the goal and definition of translational research as described above. This may include (not limited to) studies in the following example areas: (1) identification or characterization of a biological target or signaling pathway involved in a disease pathology or therapeutic invention; (2) discovery and development of novel therapeutic or diagnostic methods or agents with implications for clinical or industrial application; (3) study of the mechanism of action of currently used drugs or new experimental agents at the molecular, cellular or systems level; (4) clinical research for novel experimental therapeutics or new applications of existing drugs or that reveals mechanistic insight into a disease process or new

targets or approaches for clinical intervention or prevention; (5) development of new tools or methods by chemical, engineering, nanotechnology or computational techniques that can be applied to study biology or human diseases; and (6) genetic, proteomic or systems biological study to reveal new markers, pathways or targets for clinical application. Reports of pure clinical methods, tools, procedures, or observations without molecular, cellular or systems investigation of mechanism or insight into new mechanism or target for clinical treatment or detection are not acceptable. Studies of alternative medicine without mechanistic investigations as described above are also not accepted. For chemical, computational or engineering studies of molecular systems, some biological or clinical results must be presented, or in the absence of such data, such molecular systems should have clear potential for biological or medical application.