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Biological Systems & Services
Handbook

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Biological Systems & Services

P.O. Box 13888 ▪ 3200 Chapel Hill-Nelson Blvd., Suite 104, Research Triangle Park, NC 27709
Tel 919-547-0692 or Toll Free 1-866-ADIPOSE ▪ Fax 919-547-0693 ▪ zenbio.com

content

dear researcher,

Welcome to ZenBio. We want to be your research partner.

Being your partner means we're available. Whenever you call us at ZenBio—we personally answer your call. You'll reach someone who can give you immediate answers and assistance, not a phone-tree or a voice mailbox. We believe your time is valuable, and we promise not to waste it. The faster you receive technical support, the more time you have to devote to your research.

We're constantly adding more primary cell types to our array of products and services. Regular visits to our website **zenbio.com**—will give you familiarity with new offerings. It's also important to note that we have expanded our tissue procurement network, which has allowed us to provide some very difficult samples to our customers. You can call a procurement coordinator at any time during business hours to discuss your specialized tissue sample requirements.

ZenBio is currently developing new contract assays. Our customers have asked us to create new assays and services, including analysis for 11 Beta HSD-1, Glucose-6-phosphatase, Fatty Acid Oxidation in Skeletal Muscle, NF-kappa B ELISA, and others. If you need a particular assay and don't see it on our website, please give us a call.

We may very well be working on a new assay you can use. We also welcome the challenges of custom development assignments.

Other big news at ZenBio right now is our push into the area of functional foods research. We have a program to screen extracts and/or compounds for effects on a wide variety of cell types.

At ZenBio, we have a three-part philosophy: Deliver products of consistent high quality, provide premium customer service, and make certain our customers receive full value for their investments in ZenBio's products and services. We know you have choices in the marketplace, and we want to be your first choice among biological providers. Thank you for your business and support.

If there is ever any way we can serve you better—please let us know.

Cordially,

Peter Pieraccini
President, ZenBio, Inc.

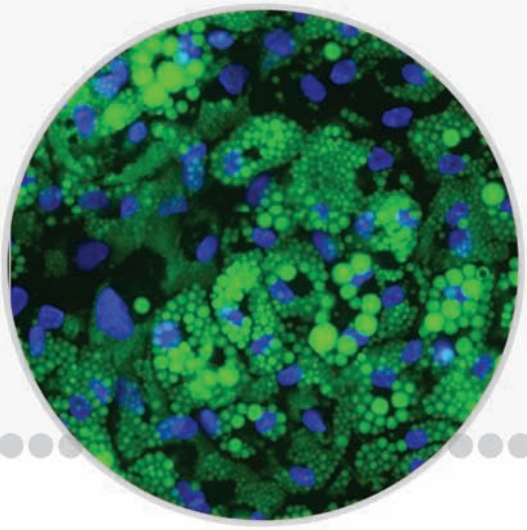
subcutaneous and visceral

ZenBio provides the highest quality primary human cultured **preadipocytes** and **adipocytes**. Our cells have many applications in basic research, drug screening, and pharmaceutical development.

We isolate cells from a wide variety of patients, with good representation from all levels of adiposity and age, from both male and female donors. Pooled lots of cells are available from donors of both sexes, which provides sufficient volumes of cells for screening while reducing patient-to-patient variability issues. ZenBio only ships cells that meet our stringent quality control parameters.

Preadipocytes are available cryopreserved or in culture. Adipocytes are differentiated *in vitro* from preadipocytes using our patent protected differentiation methods. Cells are available in a variety of plate formats. All cells are performance tested for lipid accumulation, lipolysis and glucose uptake.

Specially formulated media are available for use with our subcutaneous/visceral preadipocytes and adipocytes.

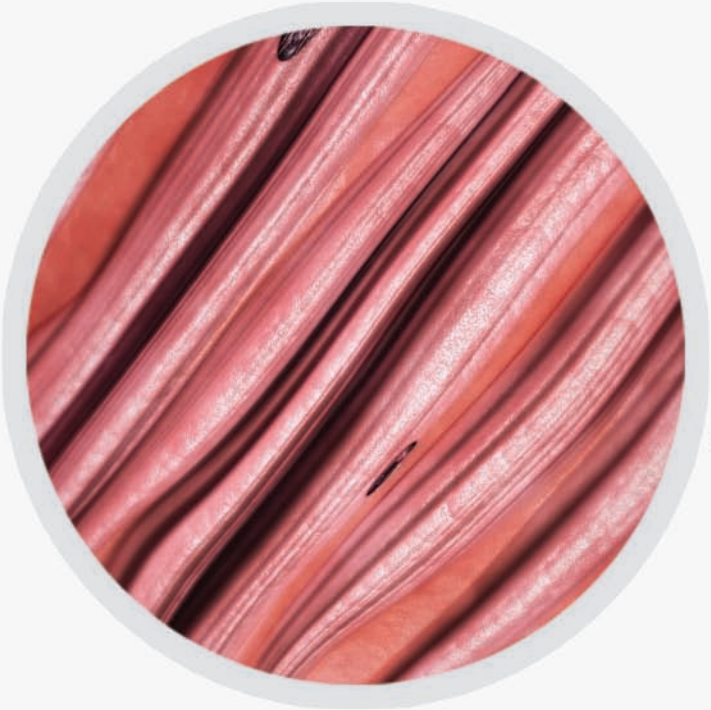


Cultured human adipocytes stained to show lipid droplets and nuclei

human skeletal myoblasts/myocytes

Skeletal muscle is an important site of insulin-stimulated glucose disposal and often the site of insulin resistance in obesity. Human primary cultured skeletal muscle cells can directly reflect a patient's metabolic phenotype, because many of the signaling pathways are maintained intact. ZenBio offers human primary skeletal muscle cells from a variety of donors, including obese donors with Type 2 diabetes.

Skeletal muscle satellite cells are isolated from the rectus abdominus and propagated in culture as myoblasts. Each lot is analyzed for myotube formation and the expression of myocyte-specific markers. The myoblasts are cryopreserved and guaranteed for use with ZenBio support media.



Human skeletal myoblasts are available for metabolic research

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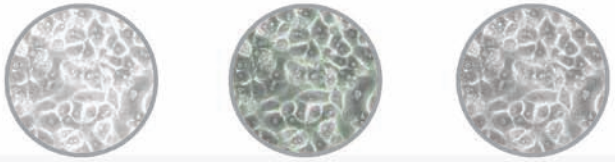
hepatocytes

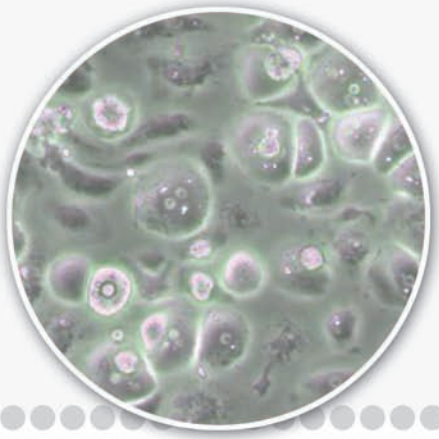


Cryopreserved mature **hepatocytes** are available as either platable or non-platable cells. These cells are terminally differentiated, non proliferating cells isolated from whole, non-transplantable human liver tissue. This offers a distinct advantage over many other hepatocyte providers in that our cells are non-tumorigenic and non-cancerous. Cells are available from a wide variety of donors, both male and female. Additionally, RNA derived from whole tissue as well as isolated hepatocytes are available. All lots of cells are available with an extensive amount of deidentified patient medical information.

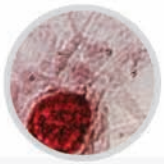
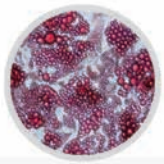
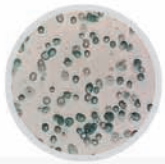
Cryopreserved hepatocytes are used to study multiple *in vitro* conditions, including hepatotoxicity, drug-drug interactions, induction studies, and testing phase I and phase II drug metabolism. Hepatocytes are isolated from whole human livers, not resected tissue.

Cells have been tested for performance in viability, ECOD, 7-HCG, and 7-HCS assays. Cells have tested negative for HIV-1, HIV-2, HTLV-1, HTLV-2, HbsAG, HbcAB, HCV, and RPR. Cells have been tested for CMV some CMV positive lots are released for experiments.

Performance of ZenBio's cryopreserved hepatocytes is guaranteed when used with our specially formulated media. Along with plating and maintenance media, we can customize formulations for your specific requirements.

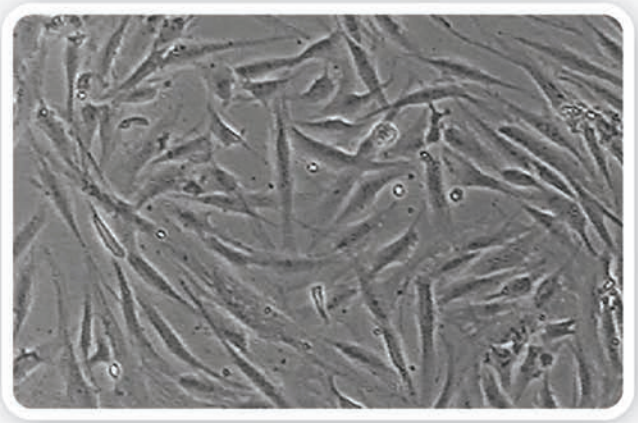


Primary human hepatocytes in culture are metabolically active

Adult adipose derived stem (ADAS) cells are available from a wide variety of patient populations. By using ZenBio's media and protocols, these pluripotent, mesenchymal cells are capable of differentiating into adipocytes, osteoblasts, and chondrocytes. All ADAS cells pass a rigorous quality control process to ensure their ability to differentiate into multiple lineages. ADAS cells have very similar phenotypic and functional characteristics to bone marrow-derived mesenchymal stem cells.

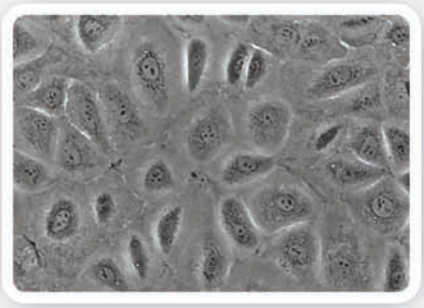
- Cells are available cryopreserved (1 million cells/vial).



Human adipose derived stem cells in culture

ZenBio unconditionally guarantees the performance of these cells when using our protocols and specially formulated media. Media systems are available for the maintenance and differentiation of our adult stem cells.

mesothelial cells



Mesothelial cells play pivotal roles in ovarian cancer metastasis, peritoneal dialysis, surgical adhesions, inflammatory response, and metabolic disease. These specialized epithelial cells form a single cell layer with a critical barrier function and provide a frictionless surface for organs and tissue to move without damage. We isolate peritoneal **mesothelial cells** from omental tissue biopsies with minimal propagation.

Mesothelial cells are available either cryopreserved or in culture. Ready to use medium is also available for use with our mesothelial cells.

Human mesothelial cells in culture

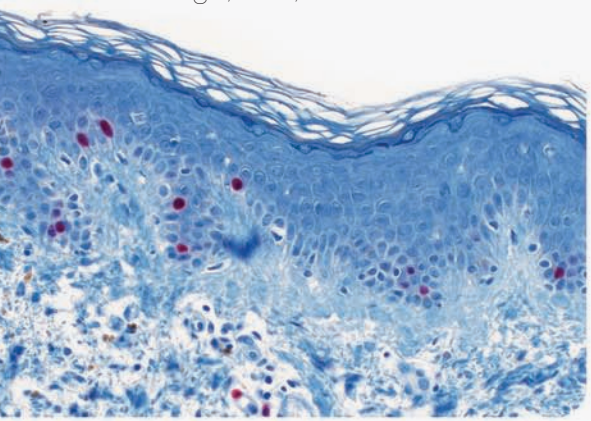
dermal fibroblasts

Our **dermal fibroblasts** are isolated from adult human skin samples and are available as cryopreserved cells or propagating cells in a variety of plate formats. We offer donor-matched dermal fibroblasts, preadipocytes, keratinocytes, and cultured adipocytes to provide investigators with donor-controlled cells for their research. Our focus on obesity and metabolic disease allows us to offer dermal fibroblasts from obese donors and those with Type 2 diabetes in addition to varying gender, age, and ethnicity.

Our low passage dermal fibroblasts provide a system to investigate fibroblast growth, migration, and collagen metabolism during wound healing, which is specifically relevant in Type 2 diabetes.

keratinocytes

ZenBio's epidermal **keratinocytes** are isolated from adult human skin samples and are provided at the earliest passage without the use of a murine feeder layer. Our keratinocytes are available with fibroblasts and preadipocytes from donors of varying gender, age, BMI, and diabetes status.



Primary human keratinocytes in culture

All ZenBio **media** are performance tested for sterility and viability. These media formulations are the result of years of experience in providing nutrients for optimal cell culture growth in research and manufacturing. Our goal is to provide customers with affordable high-quality media, allowing researchers the freedom and convenience to optimize their own systems, while removing the hassle of media formulation and sterility from their research efforts.

- **Quality Control**: In order to maintain consistent quality control, all media are manufactured under strict compliance to written operating procedures. This provides the same quality product and reliability from lot to lot.
- **Formulations**: Our media are readily available and can be ordered in various formulations with very short delivery times. In addition, all media are available without serum and/or Phenol Red-Free.

ALL MEDIA ARE PROVIDED READY TO USE.
CLASSICAL AND CUSTOM FORMULATIONS AVAILABLE UPON REQUEST.

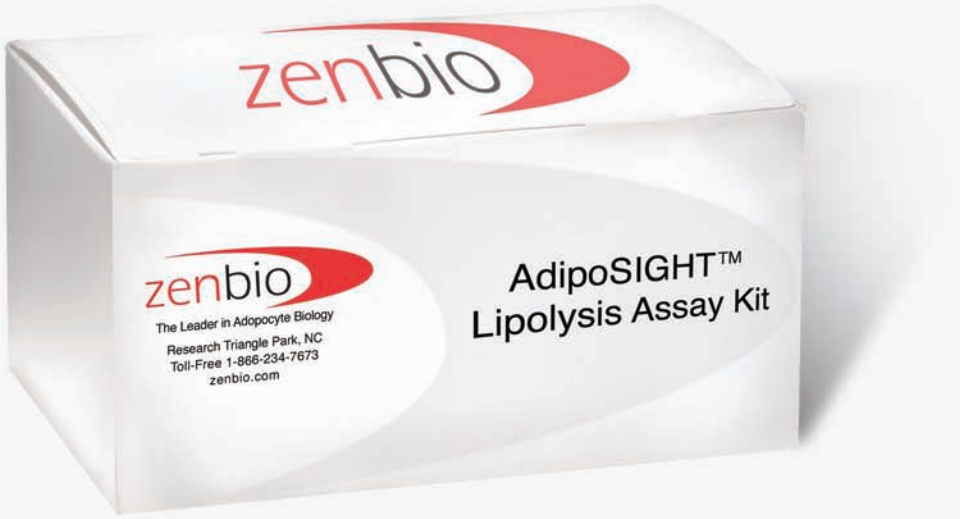
fetal bovine serum

U.S.A. ORIGIN

NEW!
OFFERING!

- Traceability
- Free of Mycoplasma
- Ultra-Low Hemoglobin Levels
- Ultra-Low Endotoxin Levels
- Triple 0.1 Micron Filtered
- Sterility Tested
- 2500 Liter Lot Sizes
- Lot-to-Lot Consistency
- Closed-System, Sterile Collection
- Rapid Processing
- Consistently Low Endotoxin Levels
- True Pool Processing
- Component Testing
- QC Tested in ZenBio's Cell Production System

ZenBio has been involved in obesity, diabetes, and metabolic disease research for more than 12 years. Our company was established to meet the urgent need of researchers for primary **human adipocytes**, to investigate the underlying mechanisms of obesity-related disorders. Through the development of our cell systems and characterization of their activities, we have generated a suite of assays that we offer as kits to the research community.



adiposight™ lipolysis assay kits

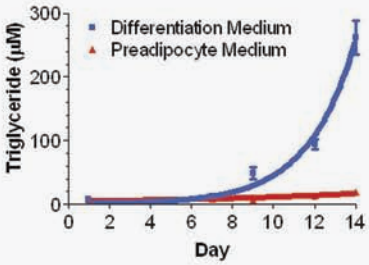
The hydrolysis of triglycerides to glycerol and free fatty acids is an important part of balancing the body's energy needs. ZenBio has created several kits to quantify **lipolysis** by measuring glycerol and free fatty acid release from cultured adipocytes. The kits are available with or without a 96-well plate of adipocytes depending on the requirements of the researcher. Our kit, measuring glycerol release, is offered as a colorimetric or fluorescent assay. The fatty acid release assay is available as a colorimetric assay.

adipogenesis assay kits

Preadipocytes can differentiate to mature adipocytes in culture in the presence of a cocktail of factors. We offer kits to identify glucocorticoid analogues or PPAR gamma agonists, two initiators of preadipocytes differentiation. The kits are available with or without a vial of cryopreserved preadipocytes, depending on the requirements of the researcher. These assay kits measure triglyceride accumulation during the differentiation process.

triglyceride assay kits

These kits contain all of the reagents necessary to quantify triglyceride accumulated in cultured cells, including primary human and animal cells, and cell lines. We offer a single plate kit containing reagents for 1, 96-well plate and a 5 plate kit suitable for larger assays.

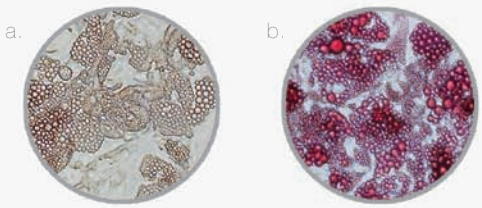


adiponectin elisa kit, cell staining kit, serum/plasma fatty acid & glycerol detection kit

adiponectin elisa kit

Adipocytes express a variety of protein hormones that modulate glucose and lipid metabolism. **Adiponectin** is an adipokine whose secretion is regulated by insulin and whose circulating levels are decreased in obesity and Type 2 diabetes. Our human Adiponectin ELISA kit is designed to measure the concentration of human adiponectin from human serum/plasma, human adipocytes, or conditioned media. The ELISA kit is available with or without a 96-well plate of adipocytes, depending on your research requirements.

cell staining kit



Cultured human adipocytes before (a.) and after (b.) Oil Red O staining

Mature adipocytes store energy by synthesizing and accumulating lipid in the form of triglyceride. Cultured human adipocytes store triglyceride in small lipid droplets that eventually can merge into a single large droplet. Oil Red O is a fat-soluble dye that can stain neutral lipids, such as triglyceride, bright red. ZenBio's **cell staining kit** provides reagents to stain mature adipocytes in a 96-well plate.

serum/plasma fatty acid & glycerol detection kit

The level of non-esterified fatty acids (NEFA) and glycerol in serum or plasma is indicative of endogenous or induced adipocyte lipolysis. Fatty acids and glycerol are released by adipocytes in response to lipolytic hormones and enter the bloodstream for utilization by other tissues. ZenBio offers kits to analyze the levels of NEFA, glycerol, or both in human and animal serum or plasma. The **serum/plasma fatty acid kits** are available in either 1, 5, or 10 plate kits.

ZenBio has developed kits to investigate the effects of natural products, extracts and compounds used in reducing signs of aging, reducing appearance of skin wrinkles, and protecting skin from environmental stressors.

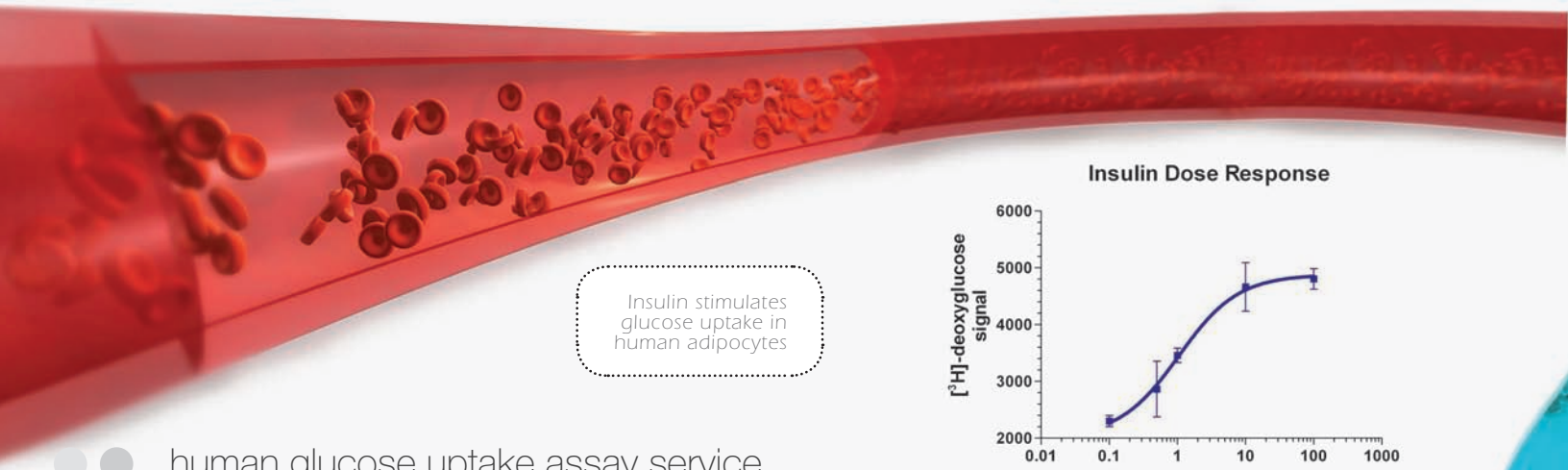
Products capable of triggering or enhancing the maturation of preadipocytes into fat cells will work with a person's own body to naturally fill in deficient areas of the skin. The creation of fat cells in an aged face can provide natural augmentation, filling out fine lines and wrinkles. ZenBio's **wrinkle screening assay kit** measures the effects of additives on triglyceride accumulation in human adipocytes.

Adipocytes (fat cells) are the principle cells involved in fat storage and are contributors to the appearance of cellulite. Our **cellulite treatment screening assay kit** measures the hydrolysis of triglyceride to glycerol and fatty acids from subcutaneous fat cells.

Environmental stressors can prematurely age skin by oxidative damage of the outer layers of the skin. ZenBio offers two assays to measure the protective **antioxidant effects** of natural products, extracts, or compounds, for anti-aging products. The ABTS and ORAC total antioxidant activity assays can be used individually or in combination to assess the protective capabilities of test samples.

contract assay services

ZenBio is a leader in the research of adipocyte biology, obesity, diabetes, and metabolic diseases. The systems we have developed are used by researchers worldwide. ZenBio's **contract assay services** help organizations with drug screening, pharmaceutical development, and natural products testing. For more than ten years, ZenBio has performed contract assays for biotechnology and pharmaceutical firms, research institutes, and cosmetic manufacturers. Our services can be fully customized and we guarantee quality results. We work according to the highest professional standards, are **GLP Certified**, and adhere to a strict confidentiality policy.



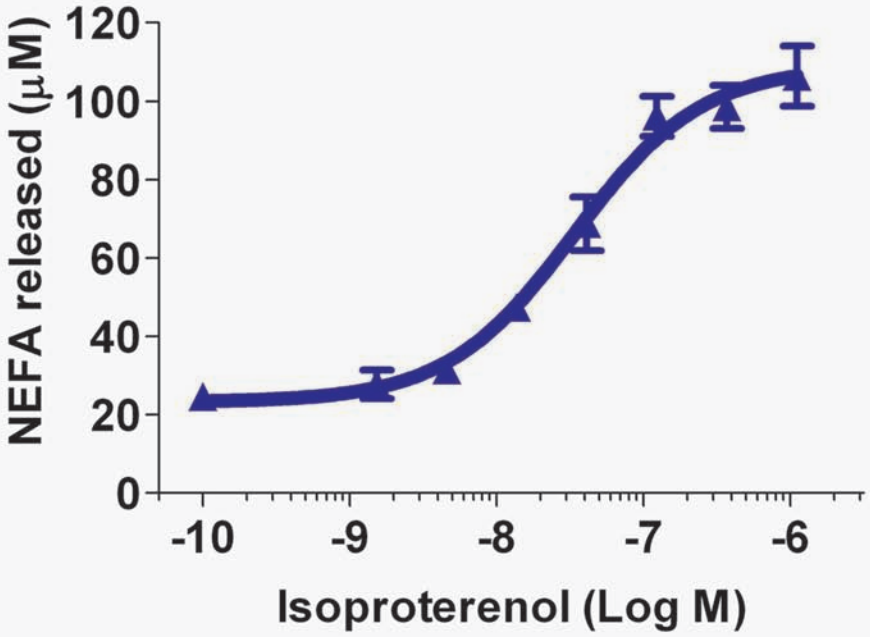
Insulin stimulates glucose uptake in human adipocytes

human glucose uptake assay service

ZenBio can perform **glucose uptake assays** in its human adipocyte system to identify agents impacting diabetes and obesity. We format our assay in 96-well plates to increase throughput and can investigate the stimulation, inhibition, and sensitization of glucose uptake. Through our procurement network, we offer this assay service using cells from donors of differing demographics (gender, BMI, ethnicity), disease states (Type 2 diabetes, hypertension) and from different adipose depots (subcutaneous, omental, and mesenteric).

lipolysis assay service

Lipolysis, the hydrolysis of triglycerides to glycerol and free fatty acids, plays a central role in the regulation of energy balance. Fatty acids released from adipocytes can be carried to tissues requiring energy while glycerol can be utilized by the liver for glycolysis or gluconeogenesis. **Exogenous lipolysis regulators** are potentially useful in the treatment of obesity, diabetes and cardiovascular disease. We format our assays in 96-well and 384-well plates for high throughput testing of lipolysis stimulation, inhibition, or sensitization. Lipolysis can be followed by analyzing the release of glycerol, free fatty acids, or both. Human adipocytes are available from donors with varying demographics and from different adipose depots as required by the contract researcher.



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lipid accumulation assay service

Adipocytes are important in maintaining proper energy balance by storing energy through **lipid accumulation**. Human preadipocytes respond to hormonal and growth factor signals, leading them to differentiate and accumulate lipid as triglyceride. Sensitizers of differentiation are potentially useful in the treatment of diabetes and cardiovascular disease, while inhibitors are potentially useful in the treatment of obesity. We format our assay in 96-well plates using preadipocytes from donors of varying demographics and from different adipose depots. The assay can be used to identify activators, inhibitors, or sensitizers of lipid accumulation during differentiation.

adipocyte 11βHSD-1 activity assay service

Glucocorticoid excess is associated with visceral obesity and insulin resistance. Cortisol, a bioactive glucocorticoid, can be produced in adipocytes by **11β-hydroxysteroid dehydrogenase** (11β-HSD) conversion of cortisone. Inhibition of this activity may be an effective treatment for obesity and metabolic disease. We assay the production of cortisol by human adipocytes in a 96-well format. The assay can identify activators or inhibitors of 11β-HSD-1 activity.

adipocyte NF-κB activation assay service

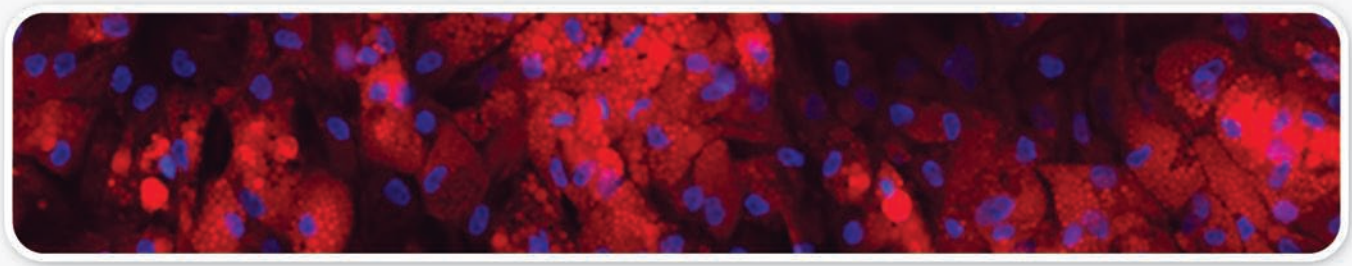
Inflammatory activity in fat tissue is related to insulin resistance and obesity-related metabolic disease. Nuclear factor-kappaB (NF-κB) is a regulator of many genes involved in the inflammatory response. Inhibitors of **NF-κB activation** may be effective in preventing obesity-related diseases. We format our assay in 96-well plates using adipocytes from different fat depots and can identify NF-κB activators or inhibitors.

adiponectin assay service

Adiponectin is a protein hormone secreted by adipose tissue (adipokine) that modulates several metabolic processes. Adiponectin secretion is decreased in obesity and Type 2 diabetes and correlates with the onset of insulin resistance and hyper-insulinemia. Our assay measures the effects of agents on human **adipocytes plated in 96-well microplates**. Mature cultured adipocytes from donors of varying demographics and different adipose depots can be used to identify selective compound effects. The secretion of adiponectin is measured by a quantitative ELISA.

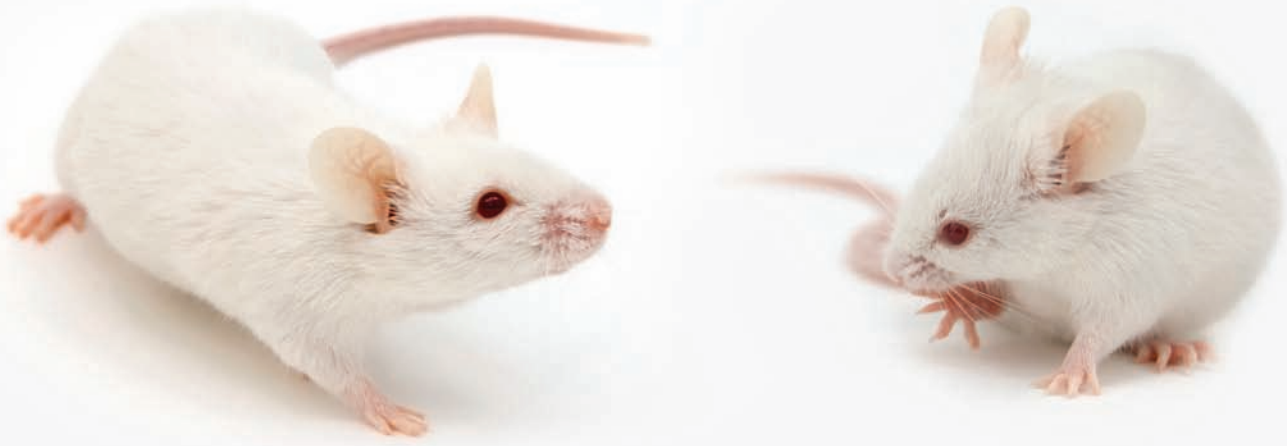
serum/plasma fatty acid & glycerol detection assay service

The level of non-esterified fatty acids (NEFA) and **glycerol** in serum or plasma is indicative of endogenous or induced adipocyte lipolysis. Fatty acids and glycerol are released by adipocytes in response to lipolytic hormones and enter the bloodstream for utilization by other tissues. ZenBio can analyze human or animal **serum/plasma** samples for their NEFA and/or glycerol content.



3T3-L1 murine adipocytes assay service

3T3-L1 murine adipocytes are commonly used as surrogates for human adipocytes. ZenBio offers contract assay services using low passage **3T3-L1 adipocytes** either alone or in direct comparison with human adipocytes. We offer the following assay services: Insulin-Stimulated Glucose Uptake, Lipolysis, and Triglyceride Accumulation. All of these assays are formatted in 96-well plates to increase throughput and are fully customizable for specific research requirements.



insulin-stimulated glucose uptake in skeletal muscle/fatty acid oxidation in skeletal muscle

ZenBio now offers contract assay services using its human primary skeletal muscle cell system. Skeletal muscle is the primary site of glucose disposal, comprising up to 70-80% of **insulin-stimulated glucose uptake**, and is the major site of obesity-related insulin resistance. Other activities relating to skeletal muscle cell metabolic responsiveness include fatty acid oxidation, glucose oxidation, and glycogen synthesis. All of these assays are available through ZenBio's contract assay services. They are performed using skeletal muscle cells in 24-well plates. The primary cells are derived from donors of differing demographics that may allow researchers to investigate the effects of their compounds across a range of donors.

Skeletal muscle is the primary site of glucose disposal, comprising up to 70-80% of insulin-stimulated glucose uptake...

custom services: cosmetic screening, wrinkle & cellulite treatment assays

cosmetic screening

ZenBio has performed **contract assay services** for **cosmetic** companies to identify additives with beneficial properties. Using our human adipocyte cell system, dermal fibroblasts, and keratinocytes, we can investigate the effects of natural products, extracts, and compounds for their use in diminishing signs of aging, reducing the appearance of wrinkles, and protecting skin from environmental stressors.

wrinkle and cellulite treatment assays

Products capable of triggering or enhancing the maturation of preadipocytes into fat cells will work with a person's own body to naturally fill in deficient areas of the skin. The creation of fat cells in an aged face can provide natural augmentation filling out fine lines and wrinkles. ZenBio's **wrinkle treatment assay** measures the effects of additives on triglyceride accumulation in human adipocytes.

Adipocytes (fat cells) are the principal cells involved in fat storage and are contributors to the appearance of cellulite. Our **cellulite treatment assay** measures the hydrolysis of triglyceride to glycerol and fatty acids in subcutaneous fat cells.

total antioxidant assays

Environmental stressors can prematurely age skin by causing oxidative damage to the dermis. ZenBio offers two assays to assess the protective **antioxidant** effects of natural products, extracts, or compounds that may be useful for anti-aging products. The ABTS and ORAC total antioxidant activity assays can be used individually or in combination to assess the protective capabilities of test samples. These assays can be performed in 96-well or 384-well format to speed throughput and the activities are compared to known antioxidant standards.

primary skin cell assay

ZenBio also offers human dermal fibroblasts and keratinocytes for testing the effects of cosmetic additives. We can assess test samples for their effects on cell proliferation and cytotoxicity using these **primary cells**. This information is useful for determining dosing limits and avoiding unwanted side effects on the skin.

custom procurement

ZenBio offers cells, tissues, and serum from a diverse group of donor populations. Products are available from mixed donor lots, individual donor lots, and a variety of disease states, such as Type 2 diabetes, hypertension, and others. ZenBio can often provide additional value added information, such as blood panels and history of disease. In the event we do not have samples from a donor demographic that meets your needs, we are able to custom tailor a solution.

If your discovery effort requires access to serum, multiple tissue types, current medications, a patient's deidentified medical history or patients from a variety of disease states, we are able to accommodate that request. All of our tissues are collected under IRB approved protocols from fully consented patients. ZenBio partners with surgical teams across the country to help insure access to the broadest array of patient demographics and disease states.

In addition to demographic or tissue specific **custom procurement**, ZenBio is capable of delivering all the following from a single patient: 5 ml serum, 1g flash frozen adipose tissue, 1g flash frozen skeletal muscle tissue, skeletal muscle RNA, adipose tissue RNA, cryopreserved and plated skeletal muscle cells, cryopreserved and plated preadipocytes, plated adipocytes, blood panel, medication list and deidentified medical history.

custom culture services

ZenBio offers an extensive array of cell types and plate formats in our catalog. When you require a cell type or plating format not currently listed, please let us know. We will work with our surgical partners to obtain various additional tissue types as well as isolate various cell types from tissue we currently receive.

Some examples of **custom plating** include switching plate types to ones that may be used for automated, radioactive, or luminescent assays, as well as special plating requests such as culturing cells on gelatin coated glass cover slips.

In addition to offering cells plated in nearly any format, we have custom plating and screening packages available. Screening packages of 500 or more plates of differentiated passage 4 cells enable cost effective screening of compound libraries in a human cell system. **ZenBio's pricing for our million point screening package starts at under 25 cents per point.**

contact & technical support

Toll Free: 1-866-ADIPOSE (1-866-234-7673)
Telephone: (919) 547-0692
Fax: (919) 547-0693
E-mail: information@zenbio.com
Website: zenbio.com

ZenBio does not operate with a phone tree or voice mails. We do this in order to provide you with the quickest response to your research questions. When you call ZenBio during business hours, a person will always answer your call.

* ZenBio is GLP COMPLIANT and CERTIFIED

distributors

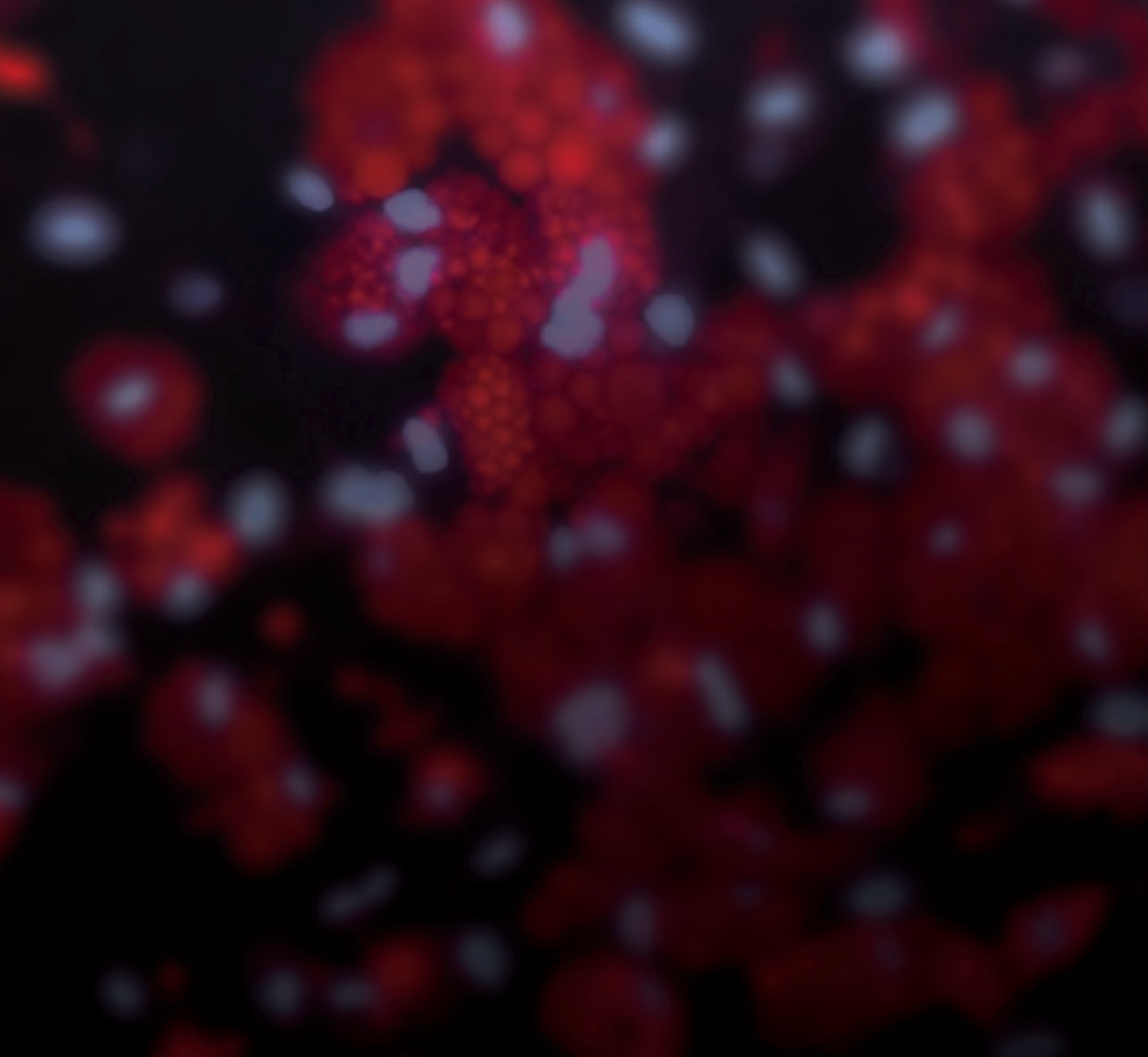
ZenBio's products are currently distributed internationally by a number of qualified companies.

If you wish to order direct you may do so, however we encourage using one of our authorized distributors.

shipping

Direct shipments are FOB destination. Freight charges are generally prepaid and added to your invoice. Please contact your distributor for their shipping policy.

ZenBio uses FedEx priority next day service. However, our Customer Support Team will work with you to determine the best shipping method for your individual needs. We strive to have every order shipped on time and delivered to you in perfect condition.



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P.O. Box 13888 ▪ 3200 Chapel Hill-Nelson Blvd., Suite 104, Research Triangle Park, NC 27709
Tel 919-547-0692 or Toll Free 1-866-ADIPOSE (1-866-234-7673) ▪ Fax 919-547-0693 ▪ zenbio.com