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AdipoGen®
Connecting Immunology to Metabolism™

International Edition

THE EXPERT FOR OBESITY

Obesity & Diabetes Research

Focus: White, Brown & Brite/Beige Adipose Tissue

During obesity, excess fat accumulates in adipose tissue. Obesity is a major risk factor for many metabolic diseases, especially diabetes and cardiovascular diseases, increasing the risk of hypertension, hyperglycemia and dyslipidemia, recognized as the metabolic syndrome. Obesity is also linked to a broad spectrum of pathological disorders including neurodegenerative diseases, airway disorders and cancer.

Two major types of adipose tissue exist in mammals, named **white (WAT) and brown adipose tissue (BAT)** composed mainly of white or brown adipocytes, respectively. **White adipose tissue (WAT)** is found throughout the body, primarily under the skin as well as in larger deposits in the abdomen. WAT represents as much as 20-25% of the body weight in humans. White adipocytes are cells of large diameter that consist of one massive lipid droplet and a thin rim containing the cytoplasm and the nucleus. White adipocytes act as storage cells for neutral triacylglycerols, storing excess calories for use in times of scarcity. WAT contributes to whole body insulation and actively communicates with key organs to maintain metabolic homeostasis by secreting adipokines (see page 2).

Brown adipose tissue (BAT) was only found in hibernating animals and to some extent in human at infancy in the past. Recently, BAT was shown to exist in human adults around the neck and collarbone, similar to where brown fat is found in mice. Brown adipocytes are usually of smaller diameter and composed of several small lipid droplets (see page 9). Their cytoplasm contains a high amount of mitochondria that are functionalized by uncoupling protein 1 (UCP1). BAT dissipates stored chemical energy in the form of heat and protects against obesity. Recently WAT was found containing cells with the characteristics of brown adipocytes. These cells were named **brite (brown-in-white), beige or brown adipocyte-like cells.** The difference between brown and brite adipocytes is under debate, but it seems that most of the brown fat in humans is actually brite.

SELECTED REVIEWS: White, brown, beige/brite: different adipose cells for different functions? M. Giralt & F. Villarroya; Endocrinology **154,** 2992 (2013) • The origin and definition of brite versus white and classical brown adipocytes: M. Rosenwald & C. Wolfrum; Adipocyte **3,** 4 (2014)

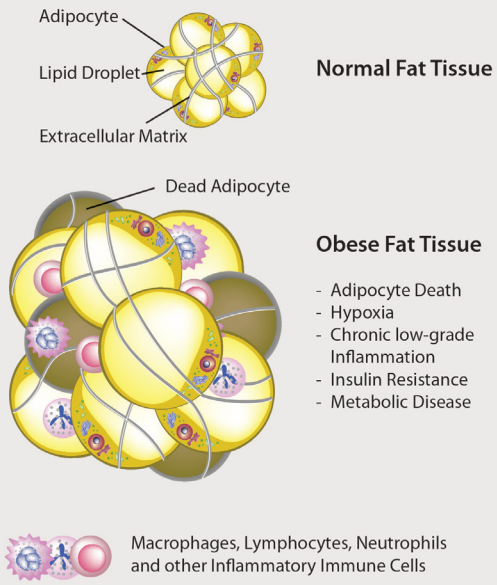

FIGURE: Adipocyte matrix interactions play a important role in pathology of obesity.

Adapted from What we talk about when we talk about fat: E.D. Rosen & B.M. Spiegelman; Cell 156, 20 (2014)

Contents

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Adipokines – Obesity, Insulin Resistance & Cardiovascular Biomarkers

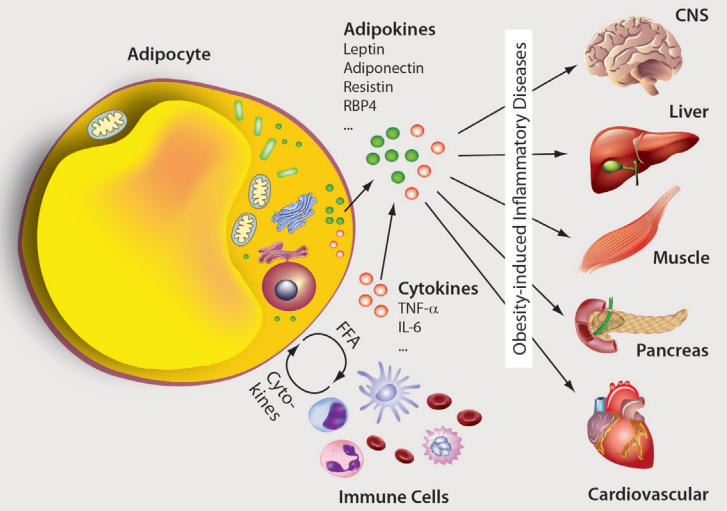

FIGURE: Schematic interaction between adipocytes and immune cells.
Adapted from H. Cao; J. Endocrinol. ***220,*** *T47 (2014)*

Adipokines are defined generally as biologically active substances produced in white adipose tissue (WAT) that act in an autocrine/paracrine or endocrine fashion and communicate with the brain, heart, vasculature, liver and muscle.

Some adipokines are produced exclusively or predominantly by adipose tissue, whereas others may be produced in a variety of different tissues. The diversity of the adipokines is considerable, in terms of both protein structure and function. Adipokines include classical cytokines (e.g. TNF-α, IL-6), chemokines (e.g. MCP-1), proteins of the alternative complement system (e.g. Adipsin), proteins involved in vascular hemostasis (e.g. PAI-1), the regulation of blood pressure (Angiotensinogen), lipid metabolism (e.g. RBP4), glucose homeostasis (e.g. Adiponectin, Leptin, Nampt/Visfatin/PBEF, Resistin, Vaspin, Omentin, Lipocalin-2, Apelin, DPP-4, CTRPs, selected ANGPTLs) and angiogenesis (e.g. VEGF, NGF). Adipokines have either pro-inflammatory or anti-inflammatory activities and exhibit a wide range of functions including the regulation of food intake and body weight homeostasis, insulin sensitivity, cell proliferation and angiogenesis, immunity, inflammation or vascular homeostasis. During obesity, adipokines are dysregulated and create a state of **chronic low-grade inflammation** responsible for the different obesity-linked pathologies and the onset of insulin resistance. Although brown adipose tissue (BAT) also produce adipokines, the endocrine roles of BAT in metabolic diseases are not fully investigated.

A growing interest in the potential role of adipokines and myokines (see page 11) as biomarkers of low-grade inflammation and metabolic diseases emerges.

SELECTED REVIEW: Adipocytokines in obesity and metabolic disease: H. Cao; J. Endocrinol. **220,** T47 (2014)

NEW

Lipocalin-2 ELISA Kits

Lipocalin-2 (LCN2) is an adipokine that is secreted from adipose tissue of both mice and humans and also known as neutrophil gelatinase-associated lipocalin (NGAL), 24p3, or neutrophil lipocalin (NL). LCN2 has been implicated in a variety of cellular processes including the innate immune response, differentiation, tumorigenesis and cell survival. Several reports suggest that LCN2 may represent a sensitive biomarker for various renal injuries and is associated with several types of cancers, including breast cancer, ovarian, colorectal and pancreatic cancers. Recent studies suggest that serum levels of lipocalin-2 are correlated with obesity, insulin resistance, hyperglycemia, coronary heart disease and fatty liver disease in humans.

SELECTED REVIEW: Lipocalin 2: a "sexy" adipokine that regulates 17β-estradiol and obesity: S.K. Fried & A.S. Greenberg; Endocrinology **153,** 1582 (2012)

		PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
Lipocalin-2 (human) ELISA Kit		**AG-45B-5003**	✔			
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	200 pg/ml	**Assay type:**				Sandwich
Range:	0.39 to 25 ng/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant
Lipocalin-2 (mouse) ELISA Kit		**AG-45B-5004**	✔			
Species reactivity:	Mouse	**Detection type:**				Colorimetric
Sensitivity:	100 pg/ml	**Assay type:**				Sandwich
Range:	0.156 to 10 ng/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant

Visit www.adipogen.com for Lipocalin-2 Antibodies and Recombinant Proteins!

High Quality Adipokine STANDARD ELISA Kits

AdipoGen®

- Reproducible results with low inter- and intra-assay variation
- High sensitivity
- Broad range of sample types (e.g serum, plasma, cell culture supernatant, urine)
- Unique intracellular detection systems

Many product specific key literature references!

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT

Adiponectin *Obesity, Insulin Resistance, Type 2 Diabetes (T2D), CVD, NAFLD, Obesity-related Inflammation, Various Cancers*

Adiponectin (human) ELISA Kit Standard		**AG-45A-0001**	✔	✔	✔	✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	100 pg/ml	**Assay type:**				Sandwich
Range:	0.5 to 32 ng/ml	**Sample type:**				Serum, Plasma, Urine, Cell Culture Supernatant
Adiponectin (human) Competitive ELISA Kit		**AG-45A-0002**	✔	✔	✔	✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	1 ng/ml	**Assay type:**				Competitive
Range:	0.001 to 1 µg/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant
Adiponectin (mouse) ELISA Kit		**AG-45A-0004**	✔	✔	✔	✔
Species reactivity:	Mouse	**Detection type:**				Colorimetric
Sensitivity:	50 pg/ml	**Assay type:**				Sandwich
Range:	0.125 to 8 ng/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant
Adiponectin (rat) ELISA Kit		**AG-45A-0005**	✔	✔	✔	✔
Species reactivity:	Rat	**Detection type:**				Colorimetric
Sensitivity:	50 pg/ml	**Assay type:**				Sandwich
Range:	0.375 to 24 ng/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant

CTRP3 *Metabolic Syndrome, Type 2 Diabetes (T2D)*

CTRP3 (human) Competitive ELISA Kit		**AG-45A-0042**	✔	✔		✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	1 ng/ml	**Assay type:**				Competitive
Range:	0.001 to 1 µg/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant

CTRP5 *Metabolic Syndrome, Type 2 Diabetes (TD2), Obesity*

CTRP5 (human) Competitive ELISA Kit		**AG-45A-0031**	✔	✔		✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	1 ng/ml	**Assay type:**				Competitive
Range:	0.001 to 5 µg/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant

Download the Adiponectin & CTRP Family Brochure for a comprehensive Overview on AdipoGen®'s ELISA Kits, Antibodies and Recombinant Proteins!

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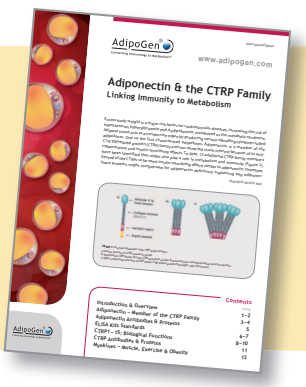


High Quality Adipokine STANDARD ELISA Kits

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT

Nampt *Diabetes, Obesity, Sepsis, IBD, Crohn's Disease, Rheumatoid Arthritis, Preeclampsia*

Nampt [Visfatin/PBEF] (human) ELISA Kit Standard	AG-45A-0006	✔	✔	✔	✔

Species reactivity:	Human	Detection type:	Colorimetric
Sensitivity:	30 pg/ml	Assay type:	Sandwich
Range:	0.125 to 8 ng/ml	Sample type:	Serum

Nampt [Visfatin/PBEF] (mouse/rat) Dual ELISA Kit	AG-45A-0007	✔	✔	✔	✔

Species reactivity:	Mouse / Rat	Detection type:	Colorimetric
Sensitivity:	50 pg/ml	Assay type:	Sandwich
Range:	0.5 to 32 ng/ml	Sample type:	Serum

For Nampt [Visfatin/PBEF] (human) Intracellular ELISA Kit see AG-45A-0008

RBP4 *Insulin Resistance, Microalbuminuria, Type 2 Diabetes (T2D), CVD, Obesity, NAFLD*

RBP4 (human) ELISA Kit (Quantitative)	AG-45A-0035	✔			✔

Species reactivity:	Human	Detection type:	Colorimetric
Sensitivity:	380 pg/ml	Assay type:	Sandwich
Range:	0.39 to 25 ng/ml	Sample type:	Serum, Plasma, Cell Culture Supernatant, Urine

RBP4 (human) Competitive ELISA Kit Standard	AG-45A-0010	✔			✔

Species reactivity:	Human	Detection type:	Colorimetric
Sensitivity:	1 ng/ml	Assay type:	Competitive
Range:	0.001 to 5 µg/ml	Sample type:	Serum, Plasma, Cell Culture Supernatant, Urine

For RBP4 (mouse/rat) Dual ELISA Kit see AG-45A-0012

Resistin *Insulin Resistance, Type 2 Diabetes (T2D), Obesity, NAFLD, Various Inflammatory Diseases*

Resistin (human) ELISA Kit	AG-45A-0023	✔	✔	✔	✔

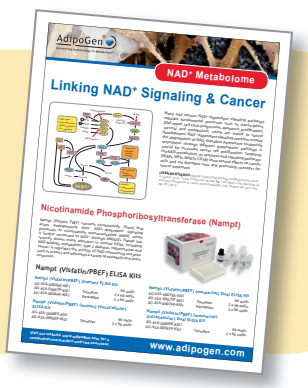
Species reactivity:	Human	Detection type:	Colorimetric
Sensitivity:	100 pg/ml	Assay type:	Sandwich
Range:	0.125 to 8 ng/ml	Sample type:	Serum, Plasma, Cell Culture Supernatant

For Resistin (mouse) ELISA Kit see AG-45A-0024

Vaspin *Type 2 Diabetes (T2D), Obesity, Insulin Resistance, CVD, NAFLD*

Vaspin (human) ELISA Kit Standard	AG-45A-0017	✔	✔	✔	✔

Species reactivity:	Human	Detection type:	Colorimetric
Sensitivity:	12 pg/ml	Assay type:	Sandwich
Range:	0.016 to 1 ng/ml	Sample type:	Serum, Plasma, Cell Culture Supernatant



High Quality Obesity-related ELISA Kits

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT

ANGPTL3 *CVD, NAFLD, Insulin Resistance, Rheumatoid Arthritis*

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
ANGPTL3 (human) ELISA Kit	**AG-45A-0014**	✔			✔

Species reactivity:	Human	**Detection type:**	Colorimetric
Sensitivity:	150 pg/ml	**Assay type:**	Sandwich
Range:	0.156 to 10 ng/ml	**Sample type:**	Serum, Plasma, Cell Culture Supernatant

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
ANGPTL3 (mouse/rat) Dual ELISA Kit	**AG-45A-0015**	✔			✔

Species reactivity:	Mouse / Rat	**Detection type:**	Colorimetric
Sensitivity:	15 pg/ml	**Assay type:**	Sandwich
Range:	0.016 to 1 ng/ml	**Sample type:**	Serum, Plasma, Cell Culture Supernatant

ANGPTL6 *Type 2 Diabetes (T2D), Obesity, Insulin Resistance, Preeclampsia*

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
ANGPTL6 (human) ELISA Kit	**AG-45A-0016**	✔			✔

Species reactivity:	Human	**Detection type:**	Colorimetric
Sensitivity:	1.2 ng/ml	**Assay type:**	Sandwich
Range:	1.56 to 100 ng/ml	**Sample type:**	Serum, Plasma, Cell Culture Supernatant

Broad Panel of ANGPTL Antibodies & Proteins! *Ask for the ANGPTL Brochure!*

Clusterin *Type 2 Diabetes (T2D), Cancer (Hepatic, Pancreatic, Gastric), Neurodegenerative Diseases*

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
Clusterin (human) Competitive ELISA Kit	**AG-45A-0013**	✔			✔

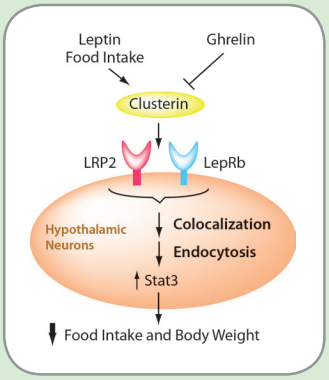
Species reactivity:	Human	**Detection type:**	Colorimetric
Sensitivity:	1 ng/ml	**Assay type:**	Competitive
Range:	0.001 to 5 µg/ml	**Sample type:**	Serum, Plasma, Cell Culture Supernatant

Latest Insight

Clusterin – Hypothalamic Maintenance of Energy Balance

Hypothalamic feeding circuits are essential for the maintenance of energy balance. S.Y. Gil, et al. recently reported that administration of clusterin (Prod. No. AG-40A-0050) caused anorexia, weight loss and activation of hypothalamic signal transduction-activated transcript-3 (Stat3) in mice. Inhibition of hypothalamic clusterin actions resulted in increased food intake and body weight, leading to adiposity. These effects were mediated through the mutual actions of the low-density lipoprotein receptor-related protein-2 (LRP2), a potential receptor for clusterin, and the long-form leptin receptor (LepRb), which in response to clusterin showed greatly enhanced binding in cultured neuronal cells.

LIT: Clusterin and LRP2 are critical components ofthe hypothalamic feeding regulatory pathway: S.Y. Gil, et al.; Nat. Commun. **4**, 1862 (2013)



PROTEINS	PID
Clusterin (secretory form) (human) (rec.)	AG-40A-0050
Clusterin (nuclear form) (human) (rec.) (His)	AG-40A-0047
Clusterin (nuclear form) (mouse) (rec.) (His)	AG-40A-0057

High Quality Obesity-related ELISA Kits

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT

ACE2 *Hypertension, Type 1 (T1D) and Type 2 Diabetes (T2D), CVD, Atherosclerosis, Microalbuminuria (Urine)*

ACE2 (human) ELISA Kit		**AG-45A-0022**	✔	✔	✔	✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	293 pg/ml	**Assay type:**				Sandwich
Range:	0.39 to 25 ng/ml	**Sample type:**				Urine, Cell Culture Supernatant

GPX1 *Insulin Resistance, Obesity, Type 2 Diabetes (T2D), Prostatic Cancer*

GPX1 (human) ELISA Kit		**AG-45A-0037**	✔			
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	45 pg/ml	**Assay type:**				Sandwich
Range:	0.0625 to 4 ng/ml	**Sample type:**				Plasma
GPX1 (human) (IntraCellular) ELISA Kit		**AG-45A-0034**	✔			✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	45 pg/ml	**Assay type:**				Sandwich
Range:	0.063 to 4 ng/ml	**Sample type:**				Cell Lysate

GPX3 *Hypertension, Type 1 (T1D) and Type 2 Diabetes (T2D), CVD, Atherosclerosis*

GPX3 (human) ELISA Kit		**AG-45A-0020**	✔			✔
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	100 pg/ml	**Assay type:**				Sandwich
Range:	0.5 to 32 ng/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant

NQO1 *Metabolic Syndrome, Alzheimer's Disease, Pancreatic Cancer*

NQO1 (human) (IntraCellular) ELISA Kit		**AG-45A-0036**	✔			
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	100 pg/ml	**Assay type:**				Sandwich
Range:	0.313 to 20 ng/ml	**Sample type:**				Cell Lysate

Sirtuin 1 *Metabolic Syndrome, Type 2 Diabetes , Alzheimer's Disease, Various Cancers, Inflammatory Diseases*

Sirtuin 1 (human) (IntraCellular) ELISA Kit		**AG-45A-0029**	✔			
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	30 pg/ml	**Assay type:**				Sandwich
Range:	0.032 to 2 ng/ml	**Sample type:**				Cell Lysate

Also available

PRODUCT NAME	DISEASE BIOMARKER	PID
DLK1, Soluble (human) ELISA Kit	Metabolic Syndrome	AG-45A-0032
DNER, Soluble (human) ELISA Kit	Metabolic Syndrome	AG-45A-0045
Progranulin (human) ELISA Kit	Type 2 Diabetes	AG-45A-0018
Progranulin (mouse) ELISA Kit	Type 2 Diabetes	AG-45A-0019
Progranulin (rat) ELISA Kit	Type 2 Diabetes	AG-45A-0043

Obesity-related Recombinant Proteins & Antibodies

PROTEINS	PID
βKlotho (extracellular domain) (human):Fc	AG-40A-0125
Calreticulin (human) (rec.) (His)	AG-40A-0132
Cbln3 (human) (rec.)	AG-40A-0171
Cbln4 (human) (rec.)	AG-40A-0173
CREB-binding Protein (mouse) (rec.) (His)	AG-40T-0016
FABP1 (human) (rec.) (His)	AG-40A-0039
FABP3 (human) (rec.) (His)	AG-40A-0036
FABP4 (human) (rec.) (His)	AG-40A-0035
Klotho (extracellular domain) (human):Fc	AG-40A-0124
Klotho (extracellular domain) (human):Fc	AG-40A-0124
Lipocalin-2 (human) (rec.)	AG-40A-0102
Lipocalin-2 (mouse) (rec.)	AG-40A-0106
NAD Kinase (human) (rec.) (His) (highly active)	AG-40T-0091
Nampt (Visfatin/PBEF) (human) (rec.)	AG-40A-0031
Nampt (Visfatin/PBEF) (mouse) (rec.)	AG-40A-0056
Nampt (Visfatin/PBEF) (rat) (rec.)	AG-40A-0058
NMNAT1 (human) (rec.) (His) (highly active)	AG-40T-0092
NMNAT3 (human) (rec.) (His) (highly active)	AG-40T-0093
NQO1 (human) (rec.) (His)	AG-40A-0152
NUCB2 (mouse) (rec.) (His)	AG-40A-0074
Omentin (human) (rec.)	AG-40B-0042
PEDF (human) (rec.)	AG-40B-0077
PEDF (mouse) (rec.)	AG-40B-0118
Progranulin (human) (rec.) (untagged)	AG-40A-0188
Progranulin (mouse) (rec.) (untagged)	AG-40A-0189
Progranulin (rat) (rec.) (untagged)	AG-40A-0196
RBP4 (human) (rec.)	AG-40A-0041
RBP4 (mouse) (rec.)	AG-40A-0045
RBP4 (rat) (rec.)	AG-40A-0049
Resistin (human) (rec.)	AG-40A-0010
Resistin (mouse) (rec.)	AG-40A-0011
Resistin (rat) (rec.)	AG-40A-0012
Sirtuin 1 (human) (rec.) (His)	AG-40A-0117
Sirtuin 1 (mouse) (rec.) (His)	AG-40A-0149
Sirtuin 2 (human) (rec.) (His)	AG-40A-0121
Sirtuin 5 (human) (rec.) (His)	AG-40A-0144
Sirtuin 5 (intact form) (human) (rec.) (His)	AG-40A-0139
Sirtuin 6 (human) (rec.) (His)	AG-40A-0140
Sirtuin 7 (human) (rec.) (His)	AG-40A-0147
Vaspin (human) (rec.)	AG-40A-0064
Vaspin (mouse) (rec.)	AG-40A-0094

ANTIBODIES	PID
Adiponectin Receptor 1 (human), pAb (AL238)	AG-25B-0010
Adiponectin Receptor 2 (mouse), pAb (AL241)	AG-25B-0012
Calreticulin (human), mAb (CR213-2AG)	AG-20A-0079
Calreticulin (human), pAb	AG-25A-0094
Clusterin (human), pAb	AG-25A-0099
Clusterin (mouse), pAb	AG-25A-0054
FABP3 (human), pAb	AG-25A-0040
FABP4 (human), pAb	AG-25A-0041
IDO (human), mAb (ID 177)	AG-20A-0035
IDO (mouse), pAb	AG-25A-0032
Leptin (human), mAb (HLEP 155)	AG-20A-0019
Leptin (mouse), pAb	AG-25A-0008
Leptin (rat), mAb (RLEP 227)	AG-20A-0018
Nampt (Visfatin/PBEF) (human), pAb	AG-25A-0025
Nampt (Visfatin/PBEF) (mouse), pAb	AG-25A-0028
Nampt (Visfatin/PBEF) (rat), pAb	AG-25A-0033
Nampt (Visfatin/PBEF), mAb (OMNI379)	AG-20A-0034
NMNAT2 (human), mAb (Nady-1)	AG-20A-0087
NUCB2 (mouse), pAb	AG-25A-0057
Obestatin (human), pAb	AG-25A-0043
Obestatin (mouse), pAb	AG-25A-0044
Omentin (human), mAb (Lecty-1)	AG-20B-0031
PEDF (human), mAb (rec.) (Serpy-1-4)	AG-27B-0014
PEDF, pAb (IN104)	AG-25B-0029
RBP4 (human), pAb	AG-25A-0053
RBP4 (mouse), pAb	AG-25A-0036
RBP4 (rat), pAb	AG-25A-0039
RELM-α (mouse), mAb (MREL 384)	AG-20A-0020
RELM-α (rat), mAb (RREL 804)	AG-20A-0021
RELM-β (human), mAb (HRB 149)	AG-20A-0012
RELM-β (mouse), mAb (MRB 46L)	AG-20A-0026
RELM-β (mouse), pAb	AG-25A-0022
Resistin (human), pAb	AG-25A-0013
Resistin (mouse), mAb (MRES 06)	AG-20A-0004
Resistin (rat), mAb (RRES 07)	AG-20A-0015
SHP (human), mAb (SH2G5-C)	AG-20A-0016
Stearoyl-CoA Desaturase-1 (mouse), pAb	AG-25A-0031
TDO (human), pAb	AG-25A-0106
TRB-3 (human), pAb	AG-25A-0059
Vaspin (human), mAb (VP63)	AG-20A-0045
Vaspin (mouse), pAb	AG-25A-0075

Visit www.adipogen.com for a comprehensive Overview on Antibodies and Recombinant Proteins for Metabolism Research!

Highly Active Obesity-related Transcription Factor Proteins

PROTEINS	PID	SIZE	SOURCE	SPECIES
GCN5 (human) (rec.) (His) (highly active)	AG-40T-0017	2 µg	Sf21 cells	Hu
p300 (human) (rec.) (His) (highly active)	AG-40T-0023	2 µg	Sf21 cells	Hu
PCAF (mouse) (rec.) (His) (highly active)	AG-40T-0018	20 µg	Sf21 cells	Ms
TIP60 (human) (rec.) (His) (highly active)	AG-40T-0019	2 µg	Sf21 cells	Hu

Latest Insights

FTO – A Gene Contributing to Human Obesity

A genome-wide association study (GWAS) has reproducibly associated variants within introns of FTO with increased risk for obesity and type 2 diabetes (T2D). Ubiquitous overexpression of FTO in mice resulted in increased food intake and leads to a dose-dependent increase in obesity. However, no direct connection between the obesity-associated variants and FTO expression or function has been made. S. Smemom, et al. (2014) recently showed that the obesity-associated noncoding sequences within FTO are functionally connected with the homeobox gene IRX3.

LIT: Obesity-associated variants within FTO form long-range functional connections with IRX3: S. Smemom, et al.; Nature **507,** 371 (2014)

PROTEINS	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
FTO (human) (rec.) (His)	AG-40A-0112	10 µg | 50 µg	E. coli	<1EU/µg	Hu
FTO (mouse) (rec.) (His)	AG-40A-0127	10 µg | 50 µg	E. coli	<1EU/µg	Ms
ANTIBODIES	**PID**	**SIZE**	**ISOTYPE/SOURCE**	**APPLICATION**	**SPECIES**
FTO (human), mAb (AG103)	AG-20A-0092	50 µg | 100 µg	Ms IgG2aκ	ELISA, IHC, IP, WB	Hu
FTO, mAb (FT86-4)	AG-20A-0064	50 µg | 100 µg	Ms IgG1κ	ELISA, IP, WB	Hu, Ms, Rt
FTO (human), pAb	AG-25A-0084	100 µg	Rb	ELISA, WB	Hu
FTO, mAb (FT342-1)	AG-20A-0088	50 µg | 100 µg	Rt IgG2aκ	ELISA, WB	Ms, Rt
FTO (mouse), mAb (FT62-6)	AG-20A-0083	50 µg | 100 µg	Ms IgG1κ	ELISA, IHC, IP, WB	Ms
FTO (mouse), pAb	AG-25A-0089	100 µg	Rb	ELISA, IHC, WB	Ms

COMP-Angiopoietin-1 – Fat Droplet Size Regulation

Y. J. Jung, et al. recently showed that the designed, soluble, stable and more potent angiopoietin-1 (Ang-1) variant, COMP-Ang-1, regulates adipocyte fat droplet diameter, vascular endothelial cell density and metabolic parameters in db/db mice. Additionally, K.B. Cullberg, et al. showed that weight loss and exercise effect the levels of the angiogenic factors VEGF-A, ANG-1, ANG-2 and ANGPTL-4 in the circulation and in adipose tissue of obese subjects.

LIT: The effects of designed angiopoietin-1 variant on lipid droplet diameter, vascular endothelial cell density and metabolic parameters in diabetic db/db mice: Y.J. Jung, et al.; BBRC **420,** 498 (2012) • Effect of weight loss and exercise on angiogenic factors in the circulation and in adipose tissue in obese subjects: K.B. Cullberg, et al.; Obesity (Silver Spring) **21,** 454 (2013)

BULK available!

PROTEINS	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
COMP (rat):Angiopoietin-1 (human) (rec.)	AG-40B-0147	10 µg | 50 µg | 5 x 10 µg	CHO cells	<0.05EU/µg	Hu
Angiopoietin-1 (human) (rec.)	AG-40A-0014	10 µg | 50 µg	CHO cells	<0.1EU/µg	Hu
Angiopoietin-2 (human) (rec.)	AG-40B-0114	10 µg | 3 x 10 µg	HEK 293 cells	<0.01EU/µg	Hu, Ms
Angiopoietin-2 (mouse) (rec.)	AG-40B-0131	10 µg | 3 x 10 µg	HEK 293 cells	<0.05EU/µg	Hu, Ms

Visit www.adipogen.com for Human & Mouse Ang-2 Blocking Antibodies!

APPLICATIONS: ICC: Immunocytochemistry; **IHC:** Immunohistochemistry **IP:** Immunoprecipitation; **WB:** Western blot **SPECIES: Hu** = Human; **Ms** = Mouse; **Rt** = Rat; **Rb** = Rabbit; **Prm** = Primate

Brown and Brite/Beige Adipocytes

White adipocytes are easily characterized with their large liquid droplet and their absence of thermogenic gene expression. Brown or brite adipocytes share many morphological (multiple lipid droplets, high mitochondrial density) and biochemical characteristics, including a well-characterized β-adrenergic receptor/cAMP-dependent pathway that regulates expression of the thermogenic gene UCP1, an inner mitochondrial membrane protein that dissipates the proton gradient to uncouple fuel oxidation from ATP. However, multiple lines of evidence have demonstrated that brown and brite adipocytes are in fact distinct cell types dispersed at different locations in the body. The classical brown adipocytes are found both in the interscapular region as well as in the perirenal area. Brite adipocytes are found interspersed in various white fat depots. Brown and brite adipocytes are also distinct by their differential response to various hormonal stimuli or genetic manipulations and by their gene expression signatures in cell culture.

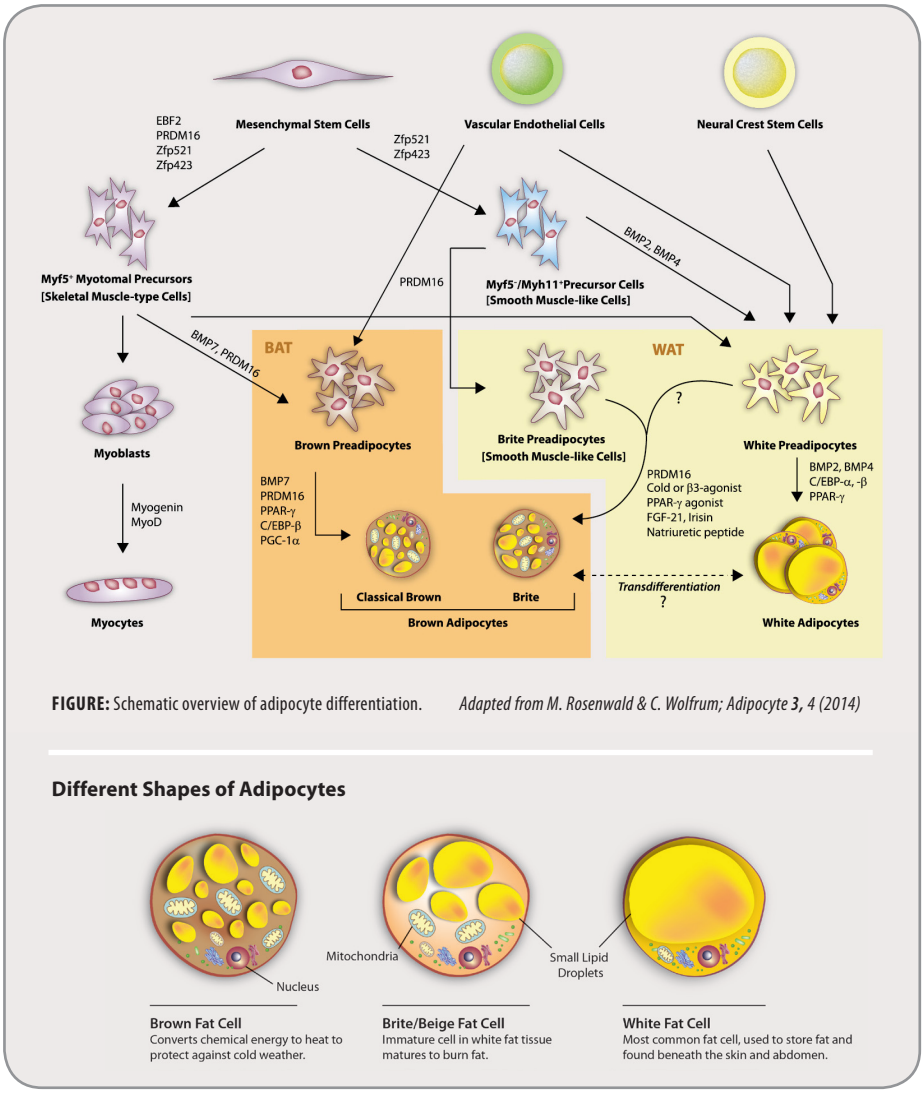


FIGURE: Schematic overview of adipocyte differentiation. *Adapted from M. Rosenwald & C. Wolfrum; Adipocyte* **3**, *4 (2014)*

Efforts to identify the stem cell progenitors of adipose tissue have revealed that the origin of white and brown preadipocytes is different. Brown adipocytes arise from a Myf5/Pax7 skeletal muscle lineage and require the transcription coregulator PRDM16. White adipocytes come from a non-myogenic precursor. Although brite cells were also thought to come from a non-myogenic origin, a recent study demonstrated that brite cells come from smooth muscle-like cells (Myh11⁺), suggesting that smooth muscle lineage may constitute a portion of previously identified white preadipocyte populations. As brite adipocytes can be differentiated using several factors (see page 10) from smooth muscle-like precursor present in white fat population, a promising and emerging avenue for obesity treatment is to increase energy expenditure by augmenting the number or the activity of thermogenic adipocytes.

SELECTED REVIEWS: The origin and definition of brite versus white and classical brown adipocytes: M. Rosenwald & C. Wolfrum; Adipocyte **3,** 4 (2014) • Distinction of white, beige and brown adipocytes derived from mesenchymal stem cells: A. Park, et al.; World J. Stem Cells **6,** 33 (2014) • Brown and beige fat: development, function and therapeutic potential: M. Harms & P. Seale; Nat. Med. **19,** 1252 (2013)

Factors that lead to WAT Browning

Several proteins, peptides, drug or stimuli that affect brite adipocytes formation by inducing WAT browning have been reported:

- **Cold exposure** is a strong inducer of brite cells. Thermogenic activity is regulated by a canonical β-adrenergic receptor pathway via the sympathetic nervous system. The **TRPM8 channel** is a cold-sensing cation channel present in sensing neurons that has a role in detecting environmental temperature. Treatment with TRPM8 agonists (e.g. menthol) also induces BAT activity, promotes energy expenditure and protects against obesity in rodents. Cold exposure also increases circulating hormones irisin and FGF-21 that induce a brown-fat-like thermogenesis program.
- **Fibroblast growth factor 21 (FGF-21)** induces the thermogenic program in brown adipocytes by interacting with FGF receptor/β-Klotho complexes at the cell surface and, subsequently, inducing mitochondrial uncoupled respiration and glucose oxidation. FGF-21 is currently used as potential drug.
- The **myokine irisin** has been shown to be a novel hormonal factor that converts white fat into the more thermogenic brite fat. Irisin is secreted and released from muscle during exercise.
- **Catecholamines** activate β-adrenergic receptor that are coupled to a G-protein and increase the intracellular cAMP level. In a subsequent process, this signal leads to fatty acid mobilization and induces the UCP1 expression in mitochondria, related to non-shivering thermogenesis.
- **Thyroid hormones (T3)** have been shown to exhibit direct stimulatory effects on UCP1 gene expression in addition to enhancing adrenergic signaling in brown adipocytes.
- **PPARs** are master regulators of adipogenesis. Recently, PPAR-γ activators thiazolidinediones were shown to promote WAT browning as well.
- **Bile acid stimulation of TGR5** (or G-protein coupled bile acid receptor 1) signaling induces the release of the GLP-1 by the intestine and activation of GLP-1 receptor signaling in the central nervous system (CNS) was found to contribute to BAT thermogenic activation.
- **Cardiac-derived natriuretic peptides (NPs)** are potent activators of lipolysis in human fat cells and can promote the browning of white fat and thermogenesis.
- The neuropeptide **orexin and its receptors** are also involved in the induction of browning and affects brown fat thermogenesis.
- **Other stimuli** are able to enhance the recruitment/formation of brite cells; these stimuli include Meteorin-like, VEGF (Vascular endothelial growth factor), BMP7 (Bone morphogenetic protein 7) and BMP8β.

SELECTED REVIEWS:

Searching for ways to switch on brown fat: are we getting warmer? A. Whittle; J. Mol. Endocrinol. **49,** R79-87 (2012) • Beyond the sympathetic tone: the new brown fat activators: F. Villarroya & A. Vidal-Puig; Cell Metab. **17,** 638 (2013) • Understanding the brown adipocyte as a contributor to energy homeostasis: K. Chechi, et al.; Trends Endocrinol. Metab. **24,** 408 (2013) • Adipose tissue plasticity from WAT to BAT and in between: Y.H. Lee, et al.; Biochim. Biophys. Acta **1842,** 358 (2014)

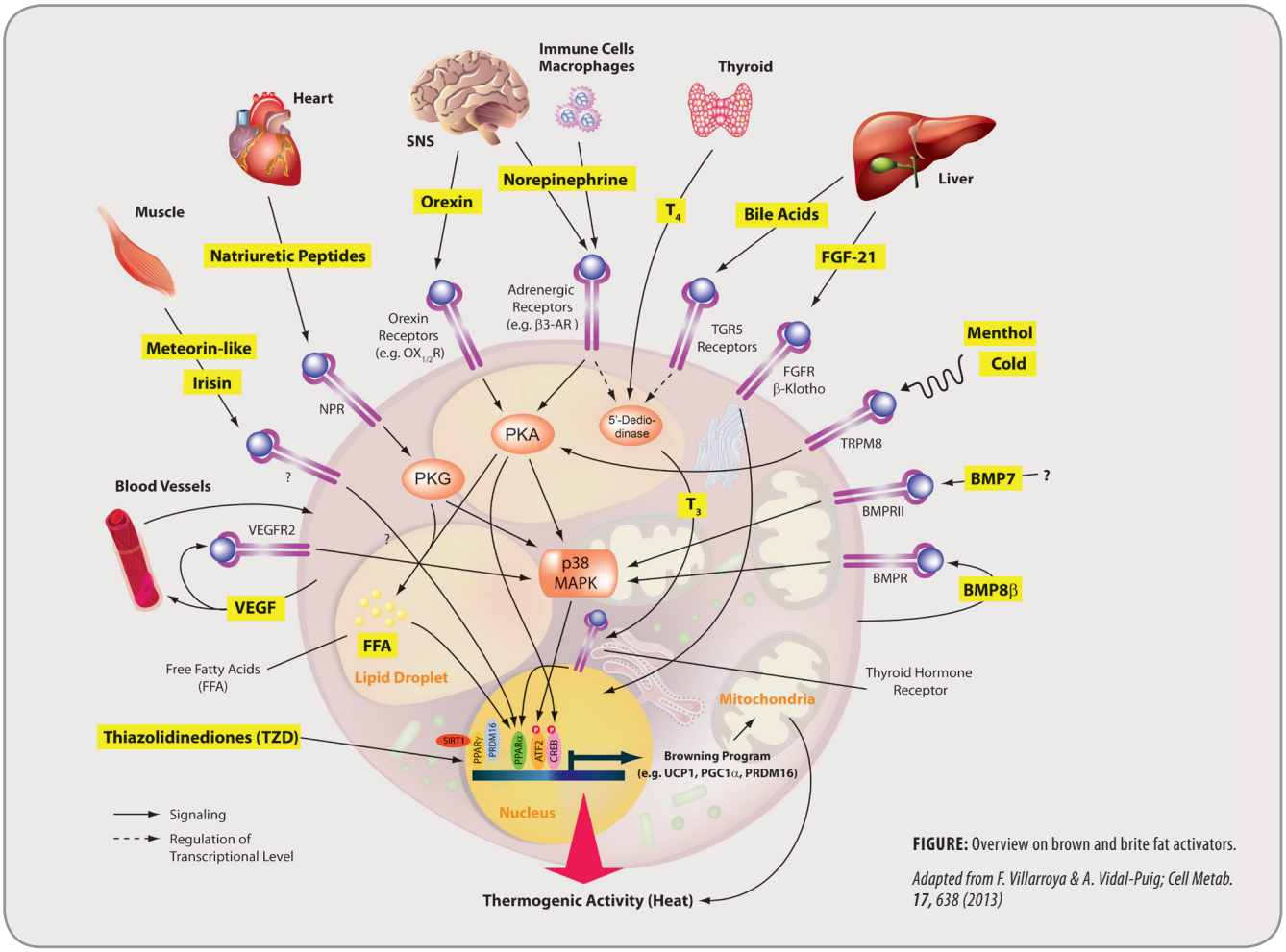
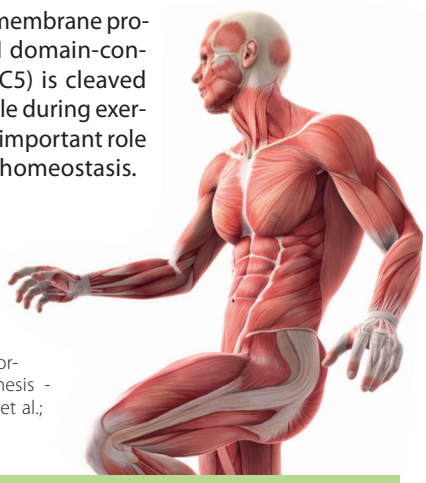


FIGURE: Overview on brown and brite fat activators.

Adapted from F. Villarroya & A. Vidal-Puig; Cell Metab. 17, 638 (2013)

Irisin – A New Myokine involved in Exercise & Obesity

Exercise training enhances muscular endurance and strength, expends calories, exerts beneficial effects on systemic metabolism and combats the development of common diseases such as obesity and type 2 diabetes (T2D), by adaptive structural and metabolic changes in skeletal muscle, including a change in the type of muscle fiber, mitochondrial biogenesis and angiogenesis. Additionally, skeletal muscle secretes cytokines and growth factors, called **myokines** that can potentially act in an autocrine, a paracrine and/or an endocrine manner to modulate metabolic, inflammatory and other processes. Irisin is a recently described exercise and PGC1-α-induced hormone secreted by skeletal muscle in mice and humans. Irisin has been identified as a myokine, which is capable of inducing browning of white adipose tissue leading to brite adipocytes by stimulating UCP1 expression, via the ERK/p38 pathways. The precursor of irisin protein, the type I transmembrane protein fibronectin type III domain-containing protein 5 (FNDC5) is cleaved and secreted from muscle during exercise. Irisin could play an important role in obesity and glucose homeostasis.



SELECTED REVIEWS:

Irisin ERKs the fat: J. Wu & B.M. Spiegelman; Diabetes **63,** 381 (2014)

Irisin as a muscle-derived hormone stimulating thermogenesis - A critical update: T. Hofmann, et al.; Peptides **54C,** 89 (2014)

Myokine: Protein or metabolite that is produced and secreted by muscle fibers and exerts either paracrine or endocrine effects.

Irisin ELISA Kit

	PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
Irisin Competitive ELISA Kit	**AG-45A-0046**	✔	✔	✔	✔

Species reactivity:	Human, Monkey, Mouse, Rat	**Detection type:**	Colorimetric
Sensitivity:	1 ng/ml	**Assay type:**	Competitive
Range:	0.001 to 5 µg/ml	**Sample type:**	Serum, Plasma, Cell Culture Supernatant

LIT: Oxytocin secretion is related to measures of energy homeostasis in young amenorrheic athletes: E.A. Lawson, et al.; J. Clin. Endocrinol. Metab. **(Epub ahead of print)** (2014)

Related Antibodies & Proteins

PROTEINS	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
Irisin (rec.) (CHO)	AG-40B-0136	10 µg | 3 x 10 µg	CHO	<0.01EU/µg	Hu, Ms
Irisin (rec.) (E. coli)	AG-40B-0103	10 µg | 5 x 10 µg	E. coli	<0.1EU/µg	Hu, Ms
Irisin:Fc (human) (rec.)	AG-40B-0115	10 µg | 5 x 10 µg	HEK293	<0.01EU/µg	Hu, Ms, Rt, Mo
FNDC4 (rec.) (untagged)	AG-40B-0124	10 µg	E. coli	<0.01EU/µg	Hu, Ms, Rt, Mo, Dg
FNDC5 (rec.) (untagged)	AG-40B-0128	10 µg	E. coli	<0.01EU/µg	Hu, Ms, Rt
ANTIBODIES	**PID**	**SIZE**	**SOURCE**	**APPLICATIONS**	**SPECIES**
anti-Irisin, pAb (IN102)	AG-25B-0027	100 µg	Rb	WB	Hu, Ms, Rt, Mo
anti-Irisin, pAb (IN102) (Biotin)	AG-25B-0027B	100 µg	Rb	WB, ELISA	Hu, Ms, Rt, Mo

Latest Insight

Interleukin-6: From Cytokine to Myokine

Recently, IL-6 was identified as a myokine implicated as a co-inducer of the development of obesity-associated insulin resistance, which precedes the development of type 2 diabetes (T2D).

LIT: From cytokine to myokine: the emerging role of interleukin-6 in metabolic regulation: M. Pal, et al.; Immunol. Cell Biol. **92,** 331 (2014) (Review) • Signaling by IL-6 promotes alternative activation of macrophages to limit endotoxemia and obesity-associated resistance to insulin: J. Mauer, et al.; Nat. Immunol. **15,** 423 (2014)

PROTEIN	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
IL-6 (mouse):Fc (human) (rec.)	AG-40B-0108	10 µg | 3 x 10 µg	HEK 293 cells	<0.01EU/µg	Ms

Visit www.adipogen.com for a complete IL-6 Product Overview!

APPLICATIONS: ICC: Immunocytochemistry; **IHC:** Immunohistochemistry **IP:** Immunoprecipitation; **WB:** Western blot **SPECIES: Hu** = Human; **Ms** = Mouse; **Rt** = Rat; **Rb** = Rabbit; **Prm** = Primate

Fibroblast Growth Factors & Adipose Tissues

Fibroblast growth factors (FGFs) are signaling proteins with diverse functions in development, metabolism and neural function. The biological effects of FGFs are mediated by four structurally related receptor tyrosine kinases FGFR1, FGFR2, FGFR3 and FGFR4. FGF-1, FGF-10, FGF-19 and FGF-21 are involved in the development and function of WAT and BAT. FGF-1 is a critical transducer in WAT remodeling. The PPARγ–FGF-1 axis is critical for energy homeostasis. FGF-10 is essential for embryonic white adipocyte development. FGF-19 is involved in controlling bile acid synthesis and activation of the farnesoid X receptor (FXR). FGF-21 has been identified as an important regulator of energy metabolism connecting nutrition, growth, reproduction and longevity. In adipose tissue, FGF-21 promotes glucose uptake and oxidation and in liver it replenishes on fasting the tissues with fuel on low nutritional supply. FGF-21 regulates PGC1-α protein levels and enhances white adipose tissue browning with upregulation of UCP1 and other thermogenic genes in a cold-exposure. Due to its multiple functions of normalizing glucose, lipid and energy homeostasis, FGFs represent attractive targets for studying WAT and BAT and potential therapeutic strategies for metabolic disorders.

SELECTED REVIEW: FGF21-based pharmacotherapy - potential utility for metabolic disorders: R.E. Gimeno & D.E. Moller; Trends Endocrinol. Metab. **(Epub ahead of print)** (2014)

NEW FGF-21 & FGF-19 ELISA Kits

NEW

		PID	SINGLE 96 wells	TWIN PLEX 2x96 wells	PENTA PLEX 5x96 wells	LIT
FGF-21 (human) ELISA Kit		**AG-45B-5001**	✔			
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	7 pg/ml	**Assay type:**				Sandwich
Range:	30 to 1920 pg/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant
FGF-19 (human) ELISA Kit		**AG-45B-5002**	✔			
Species reactivity:	Human	**Detection type:**				Colorimetric
Sensitivity:	10 pg/ml	**Assay type:**				Sandwich
Range:	31.2 to 2000 pg/ml	**Sample type:**				Serum, Plasma, Cell Culture Supernatant

PROTEINS	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
FGF-1 (human) (rec.)	AG-40B-0137	10 µg | 3 x 10 µg	E. coli	<0.01EU/µg	Hu
FGF-1 (mouse) (rec.)	AG-40B-0148	10 µg | 3 x 10 µg	E. coli	<0.01EU/µg	Ms
FGF-19 (human) (rec.)	AG-40A-0186	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Hu
FGF-19 (human) (rec.) (His)	AG-40A-0111	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Hu
FGF-19 (human):Fc (human) (rec.)	AG-40A-0187	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Hu
FGF-21 (human) (rec.)	AG-40A-0091	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Hu
FGF-21 (human) (rec.) (His)	AG-40A-0098	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Hu
FGF-21 (human):Fc (human) (rec.)	AG-40A-0095	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Hu
FGF-21 (mouse) (rec.)	AG-40B-0143	10 µg | 3 x 10 µg	HEK 293 cells	<0.01EU/µg	Ms
FGF-21 (mouse) (rec.) (His)	AG-40A-0099	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Ms
FGF-21 (mouse):Fc (human) (rec.)	AG-40A-0097	10 µg | 50 µg	HEK 293 cells	<0.1EU/µg	Ms

NEW

Zinc-α2-glycoprotein – Marker of Fat Catabolism

ZAG is a lipolytic factor produced by certain cachexia-inducing tumors and by adipose tissue. It increases lipolysis in white adipose tissue through cAMP pathway and stimulates uncoupling protein-1 (UCP1) in brown adipose tissue leading to heat generation. AdipoGen® offers a biological active protein.

SELECTED REVIEW: Zinc-α2-glycoprotein as a marker of fat catabolism in humans: A. Cabassi & S. Tedeschi; Curr. Opin. Clin. Nutr. Metab. Care **16,** 267 (2013)

PROTEIN	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
Zinc-α-2-glycoprotein (human) (rec.)	AG-40B-0146	10 µg | 50 µg	E. coli	<0.1EU/µg	Hu

APPLICATIONS: ICC: Immunocytochemistry; **IHC:** Immunohistochemistry **IP:** Immunoprecipitation; **WB:** Western blot **SPECIES: Hu** = Human; **Ms** = Mouse; **Rt** = Rat; **Rb** = Rabbit; **Prm** = Primate

Betatrophin – Linking Adipose Tissue & β Cells

Betatrophin (RIFL; Lipasin; Angiopoietin-like protein 8 (ANGPTL8)) is a new secreted protein of 198 aa that has been proposed to promote β cell proliferation and improve glucose tolerance in mice. It is expressed in the liver and in white and brown adipose tissue of mice. Betatrophin may also function in inhibition of lipase activity and on serum triglyceride regulation. In humans, betatrophin is found to be predominantly expressed in the liver. Recently, Irisin was shown to increase the expression of betatrophin.

LIT: Mice lacking ANGPTL8 (Betatrophin) manifest disrupted triglyceride metabolism without impaired glucose homeostasis: Y. Wang, et al.; PNAS **110,** 16109 (2013) • The p38-PGC-1α-irisin-betatrophin axis: Exploring new pathways in insulin resistance: F. Sanchis-Gomar & C. Perez-Quilis; Adipocyte **3,** 67 (2014)

Download the Betatrophin Flyer for more Information or visit www.adipogen.com!

PROTEINS	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
Betatrophin (human):Fc (human) (rec.)	AG-40B-0145	10 µg | 3 x 10 µg	HEK 293 cells	<0.1EU/µg	Hu
Betatrophin (mouse) (rec.)	AG-40B-0144	10 µg | 3 x 10 µg	CHO cells	<0.1EU/µg	Ms
Betatrophin (mouse):Fc (human) (rec.)	AG-40B-0142	10 µg | 3 x 10 µg	HEK 293 cells	<0.1EU/µg	Ms

NEW

NEW "Browning" Agents

Meteorin-like Protein

Meteorin-like (Cometin; Subfatin) is a novel adipokine expressed by adipose tissue being downregulated upon caloric restriction. Meteorin-like is also a myokine secreted by muscles during exercise and was shown to convert white adipose cells into brown fat tissue.

REFERENCE: B.M. Spiegelman - Keystone Obesity Meeting 2014

PROTEIN	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
Meteorin-like (mouse) (rec.)	AG-40B-0149	10 µg | 3 x 10 µg	E. coli	<0.1EU/µg	Ms

BAIBA

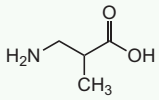
Latest insight: The contracting muscle has been shown to act as an endocrine organ, secreting "myokines" that participate in tissue crosstalk. L.D. Roberts, et al. (2014) recently identified the substance BAIBA as a contraction-induced myokine that results in browning of white adipose tissue and increases fat oxidation in the liver.

LIT: β-Aminoisobutyric acid induces browning of white fat and hepatic β-oxidation and is inversely correlated with cardiometabolic risk factors: L.D. Roberts, et al.; Cell Metab. **19,** 96 (2014)

3-Aminoisobutyric acid (BAIBA)

AG-CR1-3596-M250 — 250 mg
AG-CR1-3596-G001 — 1 g

Formula: $C_4H_9NO_2$
MW: 103.1
CAS: 144-90-1



BULK

High Purity Bile Acids for Metabolic Research

Chenodeoxycholic acid
(FXR activator)

AG-CN2-0410 — 100 mg | 500 mg

Ursodeoxycholic acid
(Pregnane X receptor agonist)

AG-CN2-0411 — 1 g | 5 g

AMPK – A Metabolic Master Switch

From the Manufacturer!

AMPK (AMP-activated protein kinase) is an enzyme that plays a role in cellular energy homeostasis, regulating several intracellular systems including hepatic fatty acid oxidation and ketogenesis, inhibition of cholesterol synthesis, lipogenesis and triglyceride synthesis, stimulation of skeletal muscle fatty acid oxidation and muscle glucose uptake as well as modulation of insulin secretion by pancreatic β cells.

SELECTED REVIEW: Past strategies and future directions for identifying AMP-activated protein kinase (AMPK) modulators: S.E. Sinnett & J.E. Brenman; Pharmacol. Ther. **(Epub ahead of print)** (2014)

BULK

AICAR

AG-CR1-0061-M010	10 mg
AG-CR1-0061-M050	50 mg
AG-CR1-0061-M100	100 mg

Formula: $C_9H_{14}N_4O_5$
MW: 258.2
CAS: 2627-69-2

Cell permeable AMP-activated protein kinase (AMPK) activator. Insulin mimetic.

Other AMPK Modulators

Sauchinone (AMPK activator)
AG-CN2-0032 — 1 mg | 5 mg

(-)-Epigallocatechin gallate [EGCG] (AMPK activator)
AG-CN2-0063 — 25 mg | 100 mg

Piceatannol (Promotes AMPK phosphorylation & GLUT4 translocation)
AG-CN2-0086 — 1 mg | 5 mg | 25 mg

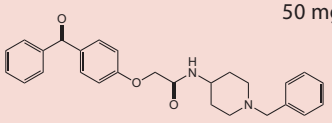
NEW

AdipoRon

BULK available!

AG-CR1-0154-M010	10 mg
AG-CR1-0154-M050	50 mg

Formula: $C_{27}H_{28}N_2O_3$
MW: 428.5
CAS: 924416-43-3



AdipoR agonist. AMPK & PGC1α activator. Improves diabetes, glucose and lipid metabolism and insulin sensitivity.

LIT: A small-molecule AdipoR agonist for type 2 diabetes and short life in obesity: M. Okada-Iwabu, et al.; Nature **503,** 493 (2013) • Cell Biology. Ronning after the adiponectin receptors: W.L. Holland & P.E. Scherer; Science **342,** 1460 (2013)

Also Available

Compound 112254 (AMPK activator)
AG-CR1-0155 — 10 mg | 50 mg

NEW Compounds with increased Solubility

AdipoRon . HCl (water soluble) — AG-CR1-0156
Compound 112254 . HCl (water soluble) — AG-CR1-0157

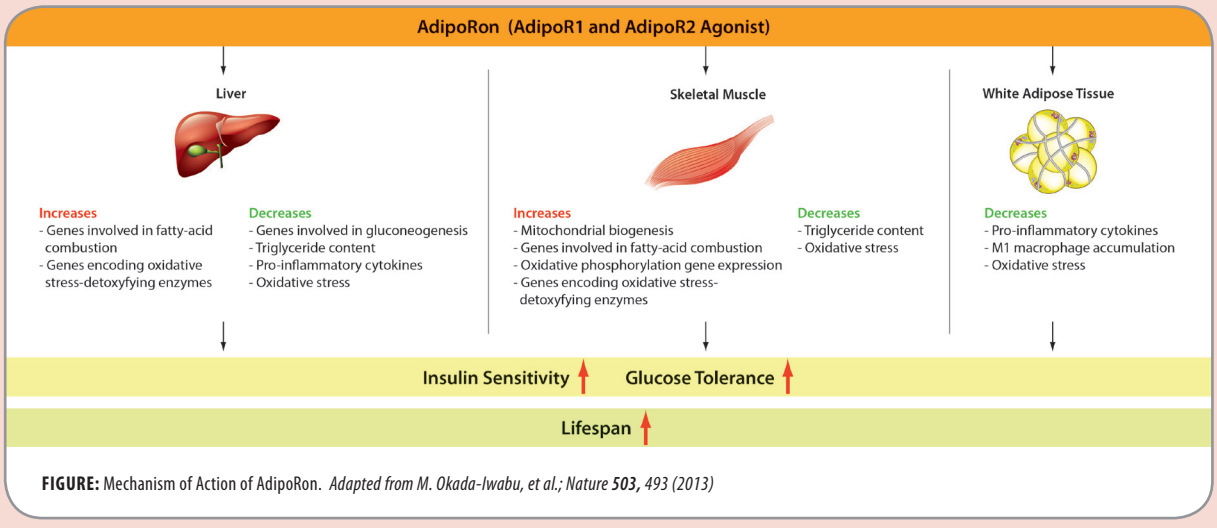


FIGURE: Mechanism of Action of AdipoRon. *Adapted from M. Okada-Iwabu, et al.; Nature **503,** 493 (2013)*

PPARs – Regulators of Adipogenesis

PPARγ is a nuclear receptor that is highly expressed in adipose tissue and is a master regulator of adipogenesis. PPARγ is selectively activated by a class of anti-diabetic agents, the thiazolidinediones (TZD), which ameliorate insulin resistance, increase peripheral glucose utilization and improve serum lipid levels. TZDs where shown to activate PPARγ, which through PRDM16 and the deacetylase sirtuin1 (SIRT1), promote the browning of white fat, which goes in line with the crosstalk between PPARγ and the growth factors FGF-1 and FGF-21 in maintaining healthy adipose tissue. Additionally, free fatty acids (FFA) mobilized by adipose triglyceride lipase (ATGL) and hormone sensitive lipase (HSL) activate PPARα and PPARδ to promote the expression of brown adipocytes genes.

SELECTED REVIEW: PPARγ signaling and metabolism: the good, the bad and the future: M. Ahmadian, et al.; Nat. Med. **19,** 557 (2013)

Thiazolidinediones (TZDs)

Ciglitazone (Selective PPARγ agonist)
AG-CR1-0033 — 1 mg | 5 mg | 25 mg

Pioglitazone (Selective PPARγ agonist)
AG-CR1-0067 — 1 mg | 5 mg | 25 mg

Rosiglitazone (Potent PPARγ agonist)
AG-CR1-3570 — 25 mg | 100 mg | 1 g

Rosiglitazone . maleate (Potent PPARγ agonist)
AG-CR1-3571 — 25 mg | 100 mg | 1 g

Troglitazone (Potent and selective PPARγ agonist)
AG-CR1-3565 — 5 mg | 25 mg

Ask for favorable BULK Prices!

Other PPAR Modulators

Asiatic acid (PPARγ inhibitor)
AG-CN2-0400 — 5 mg | 25 mg

Astaxanthin (PPARα agonist / PPARγ antagonist) BULK!
AG-CN2-0055 — 5 mg | 25 mg

Curcumin (high purity) (PPARγ pathway activator)
AG-CN2-0059 — 10 mg | 50 mg | 250 mg

Genistein (Activates all PPAR isoforms)
AG-CN2-0427 — 10 mg | 50 mg | 250 mg

GW1929 (Selective PPARγ agonist) BULK!
AG-CR1-0116 — 1 mg | 5 mg | 25 mg

Ionomycin (free acid) (PPARγ ligand with a unique binding mode)
AG-CN2-0416 — 1 mg | 5 mg

Pseudolaric acid B (PPARα agonist)
AG-CN2-0083 — 100 µg | 1 mg

WY-14643 [Pirinic acid] (Potent PPARα activator)
AG-CR1-3566 — 10 mg | 50 mg | 250 mg

Metabolic Research Modulators

From the Manufacturer!

α-Glucosidase Inhibitors

Deoxynojirimycin (α-Glucosidase I & II inhibitor)
BVT-0112 — 1 mg | 5 mg

Luteolin (α-Glucosidase inhibitor)
AG-CN2-0098 — 5 mg | 25 mg

Pellitorine (α-Glucosidase inhibitor)
AG-CN2-0009 — 1 mg

Vitexin (α-Glucosidase inhibitor)
AG-CN2-0425 — 5 mg | 25 mg

Sirtuin (SIRT) Modulators

AK-7 (Brain-permeable SIRT2 inhibitor)
AG-CR1-3511 — 5 mg | 25 mg

Hyperforin . DCHA (Potent SIRT1/SIRT2 inhibitor)
AG-CN2-0008 — 500 µg | 1 mg

Quercetin . dihydrate (SIRT1 activator)
AG-CN2-0409 — 1 g | 5 g

Resveratrol (Potent SIRT1 activator) BULK!
AG-CN2-0033 — 50 mg | 100 mg | 500 mg

Sirtinol (Cell permeable SIRT1 inhibitor) BULK!
AG-CR1-0055 — 1 mg | 5 mg | 25 mg

Suramin . 6Na (SIRT1 and SIRT5 inhibitor) BULK!
AG-CR1-3575 — 50 mg | 250 mg | 1 g

Other Metabolic Research Reagents

Amlexanox (Selective TBK1 and IKKε inhibitor)
AG-CR1-3579 — 10 mg | 50 mg

Amidepsine A (DGAT inhibitor) BULK!
AG-CN2-0109 — 1 mg | 2.5 mg

Amidepsine D (DGAT inhibitor)
AG-CN2-0110 — 1 mg | 2.5 mg

Atpenin A5 (Mitochondrial Complex II inhibitor) BULK!
AG-CN2-0100 — 250 µg | 1 mg

EM574 (Orexigenic; Motilin receptor agonist)
AG-CN2-0102 — 250 µg | 1 mg

Geodin (Glucose uptake stimulator)
AG-CN2-0139 — 1 mg | 5 mg

Kaempferitrin (Insulinomimetic/Hypoglycemic)
AG-CN2-0039 — 1 mg | 5 mg

Orlistat (DAGLα inhibitor; Antiobesity compound) BULK!
AG-CN2-0050 — 50 mg | 250 mg

Salsalate (Anti-inflammatory and antidiabetic)
AG-CR1-3574 — 1 g | 5 g

Skyrin (Antidiabetic compound)
AG-CN2-0001 — 1 mg

Stevioside (Antidiabetic compound) BULK!
AG-CN2-0077 — 10 mg | 50 mg

Latest Insight

Netrin-1 — Macrophage Retention in Adipose Tissue

B. Ramkhelawon, et al. recently identified netrin-1 as a macrophage retention signal in adipose tissue during obesity that promotes chronic inflammation and insulin resistance. Netrin-1 acts via its receptor UNC5B to block the macrophage migration. Hematopoietic deletion of netrin-1 facilitates adipose tissue macrophage migration, reduces inflammation and improves insulin sensitivity. Netrin-1 is abundantly expressed by macrophage foam cells in atherosclerotic plaques, where its expression promotes the accumulation of macrophages and disease progression, consistent with the role of netrin-1 in obese WAT.

LIT: Netrin-1 promotes adipose tissue macrophage retention and insulin resistance in obesity: B. Ramkhelawon, et al.; Nat. Med. **20,** 377 (2014) • The neuroimmune guidance cue netrin-1 promotes atherosclerosis by inhibiting the emigration of macrophages from plaques: J.M. van Gils, et al.; Nat. Immunol. **13,** 136 (2012)

PROTEINS	PID	SIZE	SOURCE	ENDOTOXIN	SPECIES
Netrin-1 (human) (rec.)	AG-40B-0040	10 µg | 3 x 10 µg	HEK 293 cells	<0.01EU/µg	Hu, Ms, Rt
Netrin-1 (human):Fc (human) (rec.)	AG-40B-0075	10 µg	HEK 293 cells	<0.1EU/µg	Hu, Ms, Rt
UNC5B (human):Fc (human) (rec.)	AG-40B-0037	50 µg | 3 x 50 µg	HEK 293 cells	<0.1EU/µg	Hu, Ms

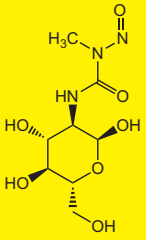
BULK

High Purity Streptozotocin
STANDARD Diabetes Inducer

Streptozotocin

AG-CN2-0046-M050	50 mg
AG-CN2-0046-M250	250 mg
AG-CN2-0046-G001	1 g

Formula: $C_8H_{15}N_3O_7$
MW: 265.2
CAS: 18883-66-4



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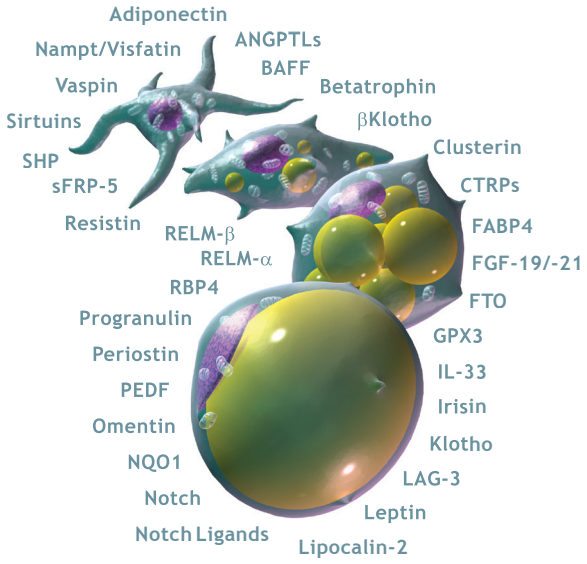

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