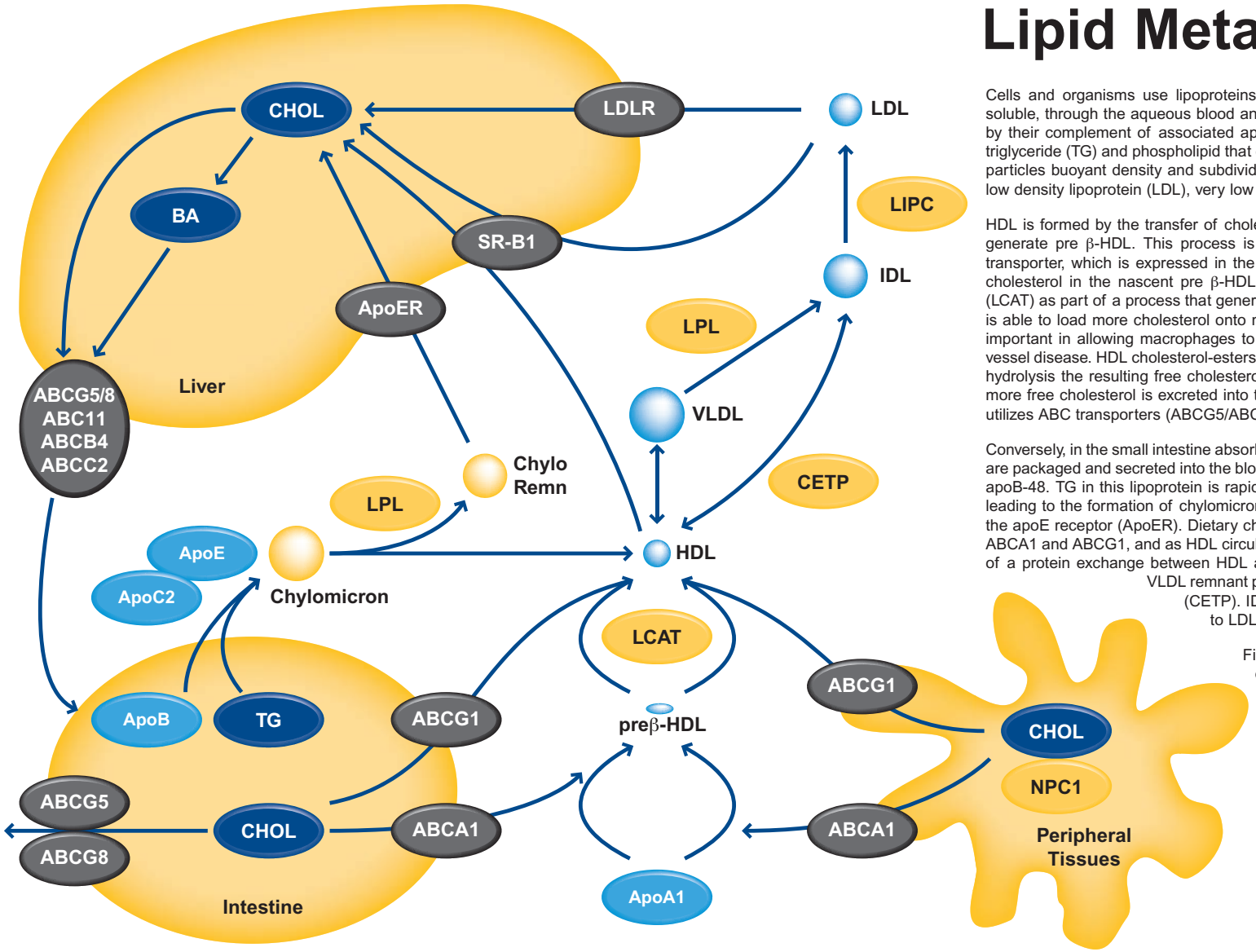
Lipid Metabolism pathway



Cells and organisms use lipoproteins to move hydrophobic lipid molecules, which are not water soluble, through the aqueous blood and tissue lymph environment. Lipoprotein particles are defined by their complement of associated apolipoproteins (Apo) and their content of cholesterol (CHOL), triglyceride (TG) and phospholipid that each particle carries. This protein and lipid content defines the particles buoyant density and subdivides them into 4 major classes: high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), and chylomicrons.

HDL is formed by the transfer of cholesterol and phospholipids onto apolipoproteinA-1 (ApoA-1) to generate pre β-HDL. This process is catalyzed by the ATP-binding cassette (ABC) A1 (ABCA1) transporter, which is expressed in the peripheral tissues, intestine and liver (not shown here). The cholesterol in the nascent pre β-HDL is then esterified by lysolecithin cholesterol acyltransferase (LCAT) as part of a process that generates mature spherical HDL. ABCG1, another ABC transporter, is able to load more cholesterol onto mature HDL from peripheral tissues and along with ABCA1 is important in allowing macrophages to efflux artery wall cholesterol, which prevents atherosclerotic vessel disease. HDL cholesterol-esters are taken up by scavenger receptor BI (SRBI) in liver and after hydrolysis the resulting free cholesterol is metabolized to bile acids (BA). The bile acids along with more free cholesterol is excreted into the digestive tract via biliary secretion in a process that again utilizes ABC transporters (ABCG5/ABCG8, ABCB11, ABCB4 and ABCC2).

Conversely, in the small intestine absorbed dietary fatty acids are converted into triglycerides (TG) and are packaged and secreted into the bloodstream as chylomicrons, a lipoprotein particle rich in TG and apoB-48. TG in this lipoprotein is rapidly hydrolyzed into free fatty acids by lipoprotein lipase (LPL), leading to the formation of chylomicron remnants (Chylo Remn), which are taken up by the liver via the apoE receptor (ApoER). Dietary cholesterol is also packaged into HDL particles by the action of ABCA1 and ABCG1, and as HDL circulates there is an increase in its apoC2 and apoE ratio because of a protein exchange between HDL and VLDL. Cholesterol ester from HDL is also transferred to VLDL remnant particles (IDL) by the action of cholesteryl ester transfer protein (CETP). IDL loses most of apolipoprotein except apoB and is converted to LDL by the action of hepatic lipase (LIPC).

Finally, LDL is taken up by liver and other tissues in an endocytotic process that involves the LDL receptor (LDLR). In humans mutations in the LDL receptor leads to elevated plasma LDL levels (hypecholesterolemia), whereas mutations in ABCA1 ablates circulating HDL (Tangier disease). Mutations of ABCG5 or ABCG8 leads to sitosterolemia, which is characterized by elevated levels of circulating cholesterol and dietary plant sterols. In all of these conditions the patients develop premature cardiovascular disease.

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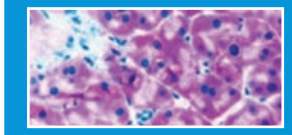
Produced in collaboration with Michael Fitzgerald PhD

Lipid Metabolism antibodies from Abcam:

www.abcam.com/cardiovascular

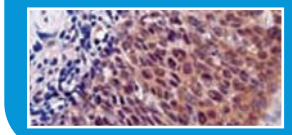
Product	Clonality	Applications	Host	Species Reactivity	Datasheet www.abcam.com/ab…
ABCA1	M	ELISA, ICC/IF, IHC-P, IP, WB	Mouse	Hu, Ms, Chk	18180
ABCA1	P	Fast Track - see datasheet	Rabbit	Hu*, Ms*, Rat*, Dog*	14146
ABCA1	P	IHC-Fr, IHC-P, IP, WB	Rabbit	Hu, Ms, Mk	7360
ABCA1	M	WB	Rat	Ms	48263
ABCB4	M	Flow Cyt, ICC, IHC-Fr, WB	Mouse	Hu	24108
ABCG1	M	ICC, IHC-P, WB	Rabbit	Hu, Ms, Rat, Cow	52617
ABCG1	P	WB	Rabbit	Ms, Hu*	36969
ABCG5	P	WB	Rabbit	Hu	45279
ABCG8	P	WB	Rabbit	Hu	45280
AMPK gamma 1	M	Flow Cyt, ICC, IHC-P, IP, WB	Rabbit	Hu	32382
Apolipoprotein A I	P	IP, WB, ELISA	Goat	Hu	7613
Apolipoprotein A I	M	IP, WB, ICC/IF, IHC-P	Rabbit	Hu	52945
Apolipoprotein B	P	Dot, ELISA, IF, IHC-P, WB	Goat	Hu, Rb	7616
Apolipoprotein B	M	ELISA, RIA	Mouse	Hu	20624
Apolipoprotein B	P	ID, IHC-P, WB	Rabbit	Hu, Ms	20737
Apolipoprotein B	P	DID, Ie, IHC-Fr, RID, RIe	Sheep	Hu, Rat, Gpig, Pig	8947
Apolipoprotein CII	P	Fast Track - see datasheet	Goat		7618
Apolipoprotein E	M	ICC/IF, IHC-P, IP, WB	Rabbit	Hu, Rat	52607
Apolipoprotein E	P	Flow Cyt, IHC-P, IP, WB	Rabbit	Hu	52924
BMAL1	M	Dot, WB	Mouse	Hu	53215
BMAL1	P	ELISA, WB	Rabbit	Hu, Ms	49421
Caveolin 1	P	ICC/IF, WB	Rabbit	Hu, Ms, Rat, Cow*, Dog*, Pig*	18199
CETP	M	ELISA, IP, WB	Mouse	Hu, Rb	2726
CETP	P	WB	Rabbit	Hu, Ms, Rat, Rb	19012
Cholesterol Oxidase	P	Conjugation, Dot, ELISA, IP, WB	Goat	Microorganisms	34495
COX2 / Cyclooxygenase 2	P	ICC, IHC-P, WB	Goat	Hu, Ms, Rat, Shp, Cow*, Dog*, Pig*	23672
COX2 / Cyclooxygenase 2	M	IHC-Fr, IHC-P	Rabbit	Hu, Ms, Rat	21704
COX2 / Cyclooxygenase 2	P	ELISA, WB	Rabbit	Hu, Ms, Rat	52237
HDL	P	ELISA, WB	Chicken	Hu	15863
HDL	M	ELISA, IHC-Fr	Mouse	Hu	34788
HDL	P	EIA, IP, RIA, WB	Rabbit	Hu	51419
LCAT	M	Flow Cyt, IP, WB, ICC/IF, IHC-P	Rabbit	Hu	51060
LDL	P	ELISA, WB	Chicken	Hu	15870
LDL	M	WB	Mouse	Hu	57471
LDL (Copper oxidized)	P	ELISA, IHC-P	Rabbit	Hu	14519
LDL Receptor	M	Flow Cyt, ICC/IF, IHC-P, IP, WB	Rabbit	Hu, Ms, Rat	52818
LDL Receptor	P	Flow Cyt, ICC, IHC-Fr, WB	Rabbit	Hu, Ms, Rat	30532
LIPG	M	WB	Mouse	Hu	56493
LIPG	P	WB	Rabbit	Hu, Ms, Bb*, Chmp*, RMk*	65364
Low Density LRP	M	Flow Cyt, IHC-P, WB, ICC/IF, ELISA, IHC-Fr	Mouse	Hu, Ms, Rb	28320
Low Density LRP	M	ELISA, Flow Cyt, IHC-Fr, IP, WB	Mouse	Hu	23346
MRP2	M	IHC-P, IP, WB, IHC-Fr, IP	Mouse	Hu, Rat	3373
PON1	P	ICC/IF, WB	Rabbit	Hu, Ms*, Rat*	53193
Scavenging Receptor SR-BI	M	BL, Flow Cyt, IHC-Fr	Mouse	Rat	37231
Scavenging Receptor SR-BI	M	ICC, IHC-P, WB	Rabbit	Hu, Ms, Rat	52629
Scavenging Receptor SR-BI	P	WB	Rabbit	Ms, Rat	24603
VLDL	P	ELISA, WB	Chicken	Hu	16419
VLDL	M	Flow Cyt, WB	Mouse	Hu	63977
VLDL	P	ELISA, ICC/IF, WB	Rabbit	Hu	35056
VLDL Receptor	M	ELISA, WB	Mouse	Hu	62543

*= predicted to react



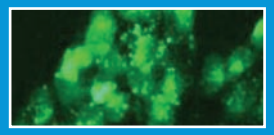
ABCA1 (ab18180)

Clonality	Applications	Host	Species cross reactivity
M	ELISA, ICC/IF, IHC-P, IP, WB	Mouse	Hu, Ms, Chk



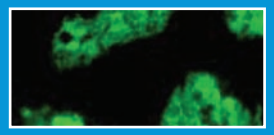
ABCG1 (ab52617)

Clonality	Applications	Host	Species cross reactivity
M	ICC, IHC-P, WB	Rabbit	Hu, Ms, Rat, Cow



Apolipoprotein E (ab52607)

Clonality	Applications	Host	Species cross reactivity
M	ICC/IF, IHC-P, IP, WB	Rabbit	Hu, Rat



LDL Receptor (ab52818)

Clonality	Applications	Host	Species cross reactivity
M	Flow Cyt, ICC/IF, IHC-P, IP, WB	Rabbit	Hu, Ms, Rat