

Table S4. Pleiotropic links between coronary artery disease (CAD) and early-life fitness-related traits due to shared genetic loci. The table below provides extensive support (143 studies) that antagonistic pleiotropy is likely to be present for CAD genes due to their consistent connections with fitness-related traits expressed early in life. See Fig. 5 for discussion and conceptual overview of these potential effects. Fitness-related traits include fertility potential, reproductive outcomes, pregnancy outcomes, fetal growth and survival, i.e. affecting the ability of an organism to reproduce and transfer genes to the next generation. The first 3 columns give CAD gene rank (no.; based on rank of 40 genes from Fig. 1B), name and full name. Columns 4-8 provide key details of each study where CAD genes also contribute to traits that influence fitness, including what species that was demonstrated in, what biological process or fitness effects that gene is impacting, what fitness class that effect is likely to impact (e.g. dysfunctional spermatogenesis or embryogenesis will affect male and female fertility, ability to conceive), what the observed genetic effect or mechanism that gene was associated with.

no.	CAD gene	full name	species	fitness effects	fitness class*	observed genetic effect or mechanism	ref
1	<i>BCAS3</i>	Breast Carcinoma Amplified Sequence 3	human/ mouse	embryogenesis	female potential fertility	<i>BCAS3</i> highly expressed in developing oocytes	[1]
	<i>BCAS3</i>		mouse	embryogenesis	female potential fertility	<i>BCAS3</i> significantly up-regulated in developmentally incompetent mouse oocytes	[2]
2	<i>CNNM2</i>	Cyclin And CBS Domain Divalent Metal Cation Transport Mediator 2	human	pregnancy-related blood pressure	pregnancy outcomes	<i>CNNM2</i> significantly differentially expressed	[3]
	<i>CNNM2</i>		mouse	pregnancy complications, hypoxia	pregnancy outcomes	<i>CNNM2</i> significantly down-regulated (-2.5 fold change) during pregnancy	[4]
3	<i>TEX41</i>	Testis Expressed 41 (Non- Protein Coding)	human	fetal IUGR, developmental delays	pregnancy outcomes	triplication involving <i>TEX41</i> causes IUGR	[5]
4	<i>SMG6</i>	Nonsense Mediated MRNA Decay Factor	mouse	altered embryogenesis	female potential fertility	<i>SMG6</i> essential for normal embryogenesis based on gene knock-down study	[6]
5	<i>PHACTR1</i>	Phosphatase And Actin Regulator 1	human	reproductive timing	reproductive outcomes	<i>PHACTR1</i> genetic variation	[7]
	<i>PHACTR1</i>		human	oocyte function	female potential fertility	<i>PHACTR1</i> highly significantly expressed	[8]
	<i>PHACTR1</i>		human	placental inflammatory responses	pregnancy outcomes	<i>PHACTR1</i> significantly down-regulated	[9]
	<i>PHACTR1</i>		human	endometrium implantation receptivity	female potential fertility	<i>PHACTR1</i> 8-fold significantly up-regulated	[10]
	<i>PHACTR1</i>		mouse	uterus functioning	female potential fertility	<i>PHACTR1</i> significant 1.4-1.9 fold change	[11]
	<i>PHACTR1</i>		rat	lactation	reproductive outcomes	<i>PHACTR1</i> significantly expressed (4.7 fold change) in mammary tissues	[12]

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6	COG5	Component of Oligomeric Golgi Complex 5	<i>Drosophila</i>	spermatogenesis	male potential fertility	<i>COG5</i> expression required for normal spermatogenesis	[13]
	COG5		human	intrauterine growth	pregnancy outcomes	<i>COG5</i> expression required for normal fetal growth	[14]
7	ABCG8	ATP-Binding Cassette, Sub-Family G, Member 8	mouse	infertility	female potential fertility	Knockout mice deficient <i>Abcg8</i> are infertile	[15]
	ABCG8		human	fetal distress, asphyxial events, intrauterine death	pregnancy outcomes	<i>ABCG8</i> involved in intrahepatic cholestasis of pregnancy (ICP), enterohepatic circulation, specifically for exportation of cholesterol	[16]
8	RAI1	Retinoic Acid Induced 1	human/ mouse	growth retardation, embryonic-postnatal development	pregnancy outcomes	knock-out mouse model for Smith-Magenis syndrome shows involvement of <i>RAI1</i>	[17]
	RAI1		mouse	growth retardation, impaired motor and sensory coordination, smaller litter size (direct reproductive fitness)	pregnancy outcomes	Transgenic mice over-expressing <i>RAI1</i> have developmentally impaired offspring	[18]
9	NT5C2	Nucleotidase, Cytosolic II	human	female reproduction	female potential fertility	<i>NT5C2</i> is over-expressed in fallopian tube, uterine endometrium, endocervix, ectocervix	[19]
	NT5C2		human	fetal growth, birthweight, postnatal growth & metabolism	pregnancy outcomes	<i>NT5C2</i> genetic variation affects birthweight	[20]
10	LDLR	Low Density Lipoprotein Receptor	human/ mouse	IUGR in offspring of <i>LDLR</i> ^{-/-} mice. Childhood obesity.	pregnancy outcomes	<i>LDLR</i> involved in fetal/offspring growth	[21]
	LDLR		human	Placental regulation of cholesterol	pregnancy outcomes	Maternal lipid profile affecting placental protein expression of <i>LDLR</i>	[22]
	LDLR		mouse	Placental regulation of cholesterol	pregnancy outcomes	<i>LDLR</i> involved in maternal-fetal transfer of lipids	[23]
	LDLR		rat	Pregnancy loss	fetal/offspring mortality	<i>LDLR</i> rat model for diabetes	[24]
11	KCNK5	Potassium Channel, Two Pore Domain Subfamily K, Member 5	human	Fertility - sperm volume	male potential fertility	<i>KCNK5</i> involved in protein and mRNA levels in sperm	[25]
	KCNK5		human	Male infertility	male potential fertility	<i>KCNK5</i> involvement in sperm inability to fertilize egg	[26]
	KCNK5		mouse	Male infertility	male potential fertility	<i>KCNK5</i> involved in sperm volume	[27]
	KCNK5		primate	Male fertility	male potential fertility	<i>KCNK5</i> involved in sperm function	[28]
	KCNK5		mouse	Female fertility	female potential fertility	<i>KCNK5</i> involved in oocyte survival/viability	[29]
	KCNK5		cattle	Lactation	reproductive	<i>KCNK5</i> expression	[30]

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12	ABO	ABO Blood Group (Transferase A, Alpha 1-3-N-Acetylgalactosaminyltransferase; Transferase B, Alpha 1-3-Galactosyltransferase)	human	Birth weight, maternal age at child-bearing	pregnancy outcomes	outcomes <i>ABO</i> variation effects	[31]
	ABO		human	Fetal growth restriction	pregnancy outcomes	<i>ABO</i> variation effects	[32]
	ABO		human	fetal hypoxia, pregnancy complications, hemolytic disease of fetus/newborn, fetal death	pregnancy outcomes	<i>ABO</i> incompatibility effects	[33]
	ABO		human	protection against malaria	pregnancy outcomes	<i>ABO</i> variation effects	[34]
	ABO		human	Age at menarche	reproductive outcomes	<i>ABO</i> blood group phenotypes	[35]
	ABO		human	male infertility	male potential fertility	<i>ABO</i> involved in sperm concentration/function	[36]
	ABO		human	pregnancy complications	pregnancy outcomes	<i>ABO</i> involved in preeclampsia	[37]
	ABO		human	female fertility, embryo implantation	female potential fertility	<i>ABO</i> variation effects	[38]
13	SWAP70	SWAP Switching B-Cell Complex 70kDa Subunit	monkey	female fertility, implantation, placentation	female potential fertility	<i>SWAP-70</i> expression effects	[39]
	SWAP70		human	fetal growth restriction	pregnancy outcomes	<i>SWAP70</i> involved in preeclampsia	[40]
14	SH2B3	SH2B Adaptor Protein 3	human	intrauterine/postnatal growth	pregnancy outcomes	<i>SH2B3</i> variation effects	[41]
	SH2B3		human	male testicular function	male potential fertility	<i>SH2B3</i> variation effects	[42]
15	PEMT	Phosphatidylethanolamine N-Methyltransferase	human	fetal growth, placental function	pregnancy outcomes	Choline metabolism/ <i>PEMT</i> expression effects	[43]
	PEMT		human	premature birth	pregnancy outcomes	<i>PEMT</i> variation [744CC genotype] effects	[44]
	PEMT		human	sperm quality	male potential fertility	<i>PEMT</i> variation [27774G.C] effects	[45]
	PEMT		human	fetal growth, placental function	pregnancy outcomes	mRNA levels of <i>PEMT</i> involved in fetal/placental function	[46]
	PEMT		mouse	embryo survival/viability during pre-implantation	female potential fertility	<i>PEMT</i> expression effects	[47]
	PEMT		human	fetal development	pregnancy outcomes	<i>PEMT</i> expression effects	[48]
16	MRAS	Muscle RAS Oncogene Homolog	mouse	male testicular function	male potential fertility	<i>MRAS</i> expression effects	[49]
	MRAS			embryo implantation	female potential	<i>MRAS</i> regulation by androgen	[50]

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				embryo pluripotency	fertility and progesterone receptors		
	MRAS		mouse	embryo pluripotency	female potential fertility	<i>MRAS</i> expression effects	[51]
	MRAS	Muscle RAS Oncogene Homolog	human	breastfeeding capacity	reproductive outcomes	<i>MRAS</i> expression effects	[52]
17	KIAA1462	<i>KIAA1462</i>	bird	offspring number	reproductive outcomes	<i>KIAA1462</i> expression effects	[53]
	KIAA1462		human	birth-related myometrial gene expression	pregnancy outcomes	<i>KIAA1462</i> expression effects	[54]
	KIAA1462		mouse	female reproduction	female potential fertility	<i>KIAA1462</i> highly expressed in oocytes & ovaries	[55]
	KIAA1462		pig	fetal growth	pregnancy outcomes	<i>KIAA1462</i> expression effects	[56]
	KIAA1462		human	embryo implantation	female potential fertility	<i>KIAA1462</i> significantly differentially expression	[57]
18	GUCY1A3	Guanylate Cyclase 1, Soluble, Alpha 3	cattle	embryo implantation	female potential fertility	<i>GUCY1A3</i> expression effects	[58]
	GUCY1A3			embryo implantation	female potential fertility	<i>GUCY1A3</i> expression effects	[59]
	GUCY1A3		human	placental functioning	pregnancy outcomes	<i>GUCY1A3</i> expression effects	[60]
	GUCY1A3		human	birth weight	pregnancy outcomes	<i>GUCY1A3</i> expression effects	[61]
	GUCY1A3		human	fetal growth, birthweight, postnatal growth & metabolism	pregnancy outcomes	<i>GUCY1A3</i> fetal genotype involved in fetal development	[62]
19	CDKN2B-AS1	CDKN2B Antisense RNA 1	human	fertility	female potential fertility	<i>CDKN2B-AS1</i> linked endometriosis	[63]
	CDKN2B-AS1		human	fetal growth restriction	pregnancy outcomes	<i>CDKN2B-AS1</i> variation	[64]
20	ANKS1A	Ankyrin Repeat And Sterile Alpha Motif Domain Containing 1A	cattle	fertility	female potential fertility	<i>ANKS1A</i> significant expression in endometrium and corpus luteum	[65]
	ANKS1A		cattle	fertility	female potential fertility	<i>ANKS1A</i> 6.7-fold significantly up-regulated in blastocysts	[66]
	ANKS1A		human/ mouse	male fertility	male potential fertility	<i>ANKS1A</i> expression	[67]
21	PDGFD	Platelet Derived Growth Factor D	human	female fertility	female potential fertility	<i>PDGFD</i> involved in ovarian hyperstimulation	[68]
	PDGFD		human	female reproduction	female potential fertility	<i>PDGFD</i> significantly expressed in oocytes	[69]
	PDGFD		mouse	male/female reproduction	female potential fertility	<i>PDGFD</i> significantly expressed	[70]
	PDGFD			female reproductive function	female potential fertility	<i>PDGFD</i> significantly down-regulated in endometrium	[71]
	PDGFD		rat	female reproductive function	female potential fertility	<i>PDGFD</i> significantly expressed	[72]
	PDGFD		human	pregnancy complication, preeclampsia	pregnancy outcomes	<i>PDGFD</i> significantly down-regulated in placenta	[73]
22	KSR2	Kinase Suppressor Of Ras 2	mouse	male fertility	male potential fertility	<i>KSR2</i> -/- knockout mouse model for spermatogenesis	[74]
	KSR2		cattle	female reproductive	female potential fertility	<i>KSR2</i> significantly up-	[75]

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			function	fertility	regulated in epithelial cells	
	KSR2	mouse	offspring growth	fetal/offspring mortality	<i>KSR2</i> -/- knockout mouse model	[76]
23	FLT1	Fms-Related Tyrosine Kinase 1	human	fetal development	pregnancy outcomes	<i>FLT1</i> expression effects [77]
	FLT1	mouse	offspring viability, fetal growth	pregnancy outcomes	<i>FLT1</i> knockdown effects	[78]
	FLT1	human	pregnancy loss	fetal/offspring mortality	<i>FLT1</i> involved in immune responses to placental malaria	[79]
	FLT1		female reproduction	female potential fertility	<i>FLT1</i> significantly expression in oocytes	[80]
	FLT1	human	intrauterine growth restriction	pregnancy outcomes	<i>FLT1</i> significantly up-regulated	[81]
	FLT1	human	fetal growth	pregnancy outcomes	<i>FLT1</i> significantly expressed in placenta	[82]
	FLT1	human	female reproduction	female potential fertility	<i>FLT1</i> significantly expressed in oocytes	[83]
	FLT1	human	female reproduction, implantation	female potential fertility	<i>FLT1</i> significantly expressed in uterus	[84]
	FLT1	human	female reproduction	pregnancy outcomes	<i>FLT1</i> significantly expressed in placenta, fetal tissues	[85]
	FLT1	human	intrauterine growth restriction	pregnancy outcomes	<i>FLT1</i> significantly expressed during pregnancy	[86]
24	ABCG5	ATP-Binding Cassette, Sub-Family G, Member 5	rat	intrauterine growth restriction	pregnancy outcomes	rat model of IUGR [87]
	ABCG5		trophoblast, blastocyst development	female potential fertility	<i>ABCG5</i> gene expression effects	[88]
25	ZC3HC1	Zinc Finger, C3HC-Type Containing 1		male fertility	male potential fertility	meiosis disruptors [89]
	ZC3HC1	mouse	pregnancy establishment, maintenance, conceptus survival	female potential fertility	<i>ZC3HC1</i> expression, 1.57-fold significantly changed	[90]
26	SMAD3	SMAD Family Member 3		folliculogenesis	female potential fertility	<i>SMAD3</i> expression effects [91]
	SMAD3	mouse/rat	oocyte function	female potential fertility	<i>SMAD3</i> expression effects	[92]
	SMAD3		estrogen receptor interactions	female potential fertility	<i>SMAD3</i> expression effects	[93]
	SMAD3	rat	testis function	male potential fertility	<i>SMAD3</i> expression effects	[94]
	SMAD3	human	age at natural menopause	reproductive outcomes	<i>SMAD3</i> interaction effects	[95]
	SMAD3	human	twinning capacity	reproductive outcomes	<i>SMAD3</i> genotype (rs17293443-C) effects	[96]
	SMAD3	human	female fertility and fecundity	female potential fertility	<i>SMAD3</i> promotes proliferation and steroidogenesis of human ovarian lutenized granulosa cells	[97]
	SMAD3	mouse	embryo viability	female potential fertility	<i>SMAD3</i> signalling effects	[98]

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	SMAD3		human	spermatogenesis, male reproduction	male potential fertility	<i>SMAD3</i> expression effects	[99]
27	SLC22A3	Solute carrier family 22, extra neuronal monoamine transporter	human	placental functioning	pregnancy outcomes	<i>SLC22A3</i> expression effects	[100]
	SLC22A3		human	fetal development, fetal-placental resource provisioning	pregnancy outcomes	<i>SLC22A3</i> expression effects	[101]
	SLC22A3		human	fetal-placental functioning	pregnancy outcomes	<i>SLC22A3</i> expression changes during pregnancy	[102]
	SLC22A3		human	fetal-placental functioning	pregnancy outcomes	<i>SLC22A3</i> significantly expressed by trimester	[102]
28	REST	RE1-Silencing Transcription Factor	mouse	embryo functioning	female potential fertility	<i>REST</i> regulatory network effects	[103]
29	PPAP2B	Phospholipid Phosphatase 3	human	endometriosis, female fertility	female potential fertility	<i>PPAP2B</i> -1.69-fold significantly changed	[104]
	PPAP2B		human/r odent	gametogenesis	male potential fertility	<i>PPAP2B</i> expression effects	[105]
	PPAP2B		sheep	breeding capacity	reproductive outcomes	<i>PPAP2B</i> association effects	[106]
	PPAP2B		human	pregnancy complications	pregnancy outcomes	<i>PPAP2B</i> 1.36 -fold significantly up-regulated in placental tissues of preeclamptic mothers	[107]
	PPAP2B		human	embryo viability	female potential fertility	<i>PPAP2B</i> involved in spontaneous abortion due to parthenogenesis	[108]
	PPAP2B		human	embryo implantation	female potential fertility	<i>PPAP2B</i> differential expression effects	[57]
	PPAP2B			female reproductive function	female potential fertility	<i>PPAP2B</i> up-regulated in endometrium	[71]
30	MIA3	Melanoma Inhibitory Activity Family, Member 3	cattle	ovarian functioning	female potential fertility	<i>MIA3</i> 4.6-fold significantly up-regulated	[109]
	MIA3		mouse	placental (dys)function	female potential fertility	<i>MIA3</i> expressed in early trophoblast differentiation	[110]
31	IL6R	Interleukin 6 Receptor	pig	endometrium functioning	pregnancy outcomes	<i>IL6R</i> significantly differentially expressed in endometrium	[111]
	IL6R		cattle	endometrium functioning	pregnancy outcomes	<i>IL6R</i> 3.38-fold significantly up-regulated during pregnancy	[112]
	IL6R		human	endometrium functioning in PCOS women	female potential fertility	<i>IL6R</i> significantly up- regulated	[113]
	IL6R		human	pre-term birth SNP variation	pregnancy outcomes	<i>IL6R</i> significantly associated with pre-term birth	[114]
32	HDAC9	Histone Deacetylase 9	human	oocyte function	female potential fertility	<i>HDAC9</i> expression effects	[115]
	HDAC9		cattle	male fertility	male potential fertility	<i>HDAC9</i> involved in germ cell production	[116]
	HDAC9		pig	birth weight	pregnancy outcomes	<i>HDAC9</i> expression effects	[117]

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	HDAC9		human/ mouse	oocyte function	female potential fertility	<i>HDAC9</i> expression effects	[118]
	HDAC9		human	birth-related myometrial gene expression	pregnancy outcomes	<i>HDAC9</i> expression effects	[119]
33	COL4A1	Collagen, Type IV, Alpha 1	pig	neonate survival	pregnancy outcomes	<i>COL4A1</i> expression effects	[120]
	COL4A1		human	testis function	male potential fertility	<i>COL4A1</i> expression effects	[121]
	COL4A1		mouse	folliculogenesis	female potential fertility	<i>COL4A1</i> expression effects	[122]
	COL4A1		human	fetal survival	fetal/offspring mortality	<i>COL4A1</i> mutation effects	[123]
	COL4A1			fetal/placenta growth and development	pregnancy outcomes	<i>COL4A1</i> expression effects	[124]
34	ABHD2	Abhydrolase Domain Containing 2		male fertility	male potential fertility	<i>ABHD2</i> expression effects	[125]
35	SORT1	Sortilin 1	human	endometrium functioning	pregnancy outcomes	<i>SORT1</i> significantly expressed during labour	[54]
	SORT1			ovarian functioning	female potential fertility	<i>SORT1</i> significantly up- regulated	[126]
	SORT1		rat	ovarian functioning	female potential fertility	<i>SORT1</i> expression effects	[127]
	SORT1		human	embryo implantation	female potential fertility	<i>SORT1</i> differential expression effects	[128]
36	SLC22A5	Solute Carrier Family 22 (Organic Cation/Carnitine Transporter), Member 5	mouse	male infertility	male potential fertility	<i>SLC22A5</i> mutation related to male infertility	[129]
	SLC22A5		pig	reproductive variation, offspring born alive and total born	reproductive outcomes	<i>SLC22A5</i> genotype effects on reproductive capacity	[130]
	SLC22A5		pig	age at puberty	reproductive outcomes	<i>SLC22A5</i> genotype effects	[131]
37	NOA1	Nitric Oxide Associated 1	human	male fertility, testicular functioning	male potential fertility	<i>NOA1</i> expression effects	[132]
	NOA1		mouse	embryo/trophoblast viability	female potential fertility	<i>NOA1</i> -deficient mouse model	[133]
38	LPL	Lipoprotein Lipase	human	pregnancy complications	pregnancy outcomes	<i>LPL</i> expression effects	[134]
	LPL		human	male infertility	male potential fertility	sperm DNA fragmentation related to <i>LPL</i> expression	[135]
	LPL		human	reproductive timing	reproductive outcomes	<i>LPL</i> expression effects	[7]
	LPL		human	intrauterine growth restriction	pregnancy outcomes	<i>LPL</i> -mediated fetal-placental nutrient transfer	[136]
	LPL		human/ mouse	placental functioning	pregnancy outcomes	<i>LPL</i> expression effects	[137]
	LPL			fetal/placental resource transfer, pregnancy	pregnancy outcomes	<i>LPL</i> expression effects	[138]

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		complications				
	<i>LPL</i>	human	testis/spermatogenesis	male potential fertility	<i>LPL</i> expression effects	[139]
	<i>LPL</i>	mouse	placental regulation of cholesterol	pregnancy outcomes	<i>LPL</i> involved in maternal-fetal transfer of lipids	[23]
39	<i>COL4A2</i> Collagen, Type IV, Alpha 2	mouse	fetal viability	fetal/offspring mortality	mouse knockout model for <i>COL4A2</i>	[140]
	<i>COL4A2</i>	human	testis function	male potential fertility	<i>COL4A2</i> expression effects	[121]
	<i>COL4A2</i>	human	offspring viability	fetal/offspring mortality	<i>COL4A2</i> expression effects	[141]
40	<i>ADAMST7</i> ADAM Metallopeptidase With Thrombospondin Type 1 Motif, 7	mouse	embryogenesis	female potential fertility	<i>COL4A2</i> expression effects	[142]
	<i>ADAMST7</i>	dog	mammary tissue functioning	reproductive outcomes	<i>ADAMST7</i> significantly up-regulated in mammary tissues	[143]
	<i>ADAMST7</i>	human	breastfeeding capacity	reproductive outcomes	<i>ADAMST7</i> expression effects	[52]

Table footnotes:***'fitness class' column defined further:**

- male potential fertility* - includes processes affecting spermatogenesis, sperm motility, volume or function that ultimately affect probability of successful egg fertilization.
- female potential fertility* - includes processes affecting embryogenesis (i.e. oocyte viability, survival), functioning of uterus (i.e. implantation receptivity, endometrium functioning), placentation (trophoblast cell motility) that ultimately affects initial successful establishment of pregnancy.
- pregnancy outcomes* - includes processes affecting regulation of blood pressure, nutrient and oxygen transfer between fetal and placental tissues during pregnancy that ultimately influences fetal growth, development and survival.
- fetal/offspring mortality* - includes processes linked to pregnancy defects, resistance to pathogens, affecting survival of fetus during pregnancy or perinatal mortality.
- reproductive outcomes* - includes effects on age at maturity, reproductive timing, potential number of offspring, breastfeeding capacity.

Search criteria:

- For each CAD gene, Google scholar was used to search for studies using the 'Search terms' (below) and the gene name (*BCAS3* is used as an example)
- For each search, only the first page of results was considered. Search results most consistent with all search terms are ranked by page, thus the most relevant results were always on the first page. This approach was also employed to keep this literature search tractable in terms of time (i.e. a search for each of the terms below for one gene usually took ~1 hour).
- We also used the GWAS Catalog (<https://www.ebi.ac.uk/gwas/>) using the gene name to search for further potential links to fitness related traits

Search terms (example using gene *BCAS3*):

- "*BCAS3*" and "reproduction" and gene and "-noncommercial use, distribution, and reproduction in any"
- "*BCAS3*" and "fitness" and gene
- "*BCAS3*" and "fertility" and gene
- "*BCAS3*" and "menarche" and gene
- "*BCAS3*" and "menopause" and gene
- "*BCAS3*" and "birth" or "birth weight"
- "*BCAS3*" and "pregnancy" and gene
- "*BCAS3*" and "placenta" and gene

- "BCAS3" and "implantation" and gene
- "BCAS3" and "oocyte" and gene
- "BCAS3" and "sperm" and gene
- "BCAS3" and "testis"

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