

CardioGenBase consists of four major tools to fit the user needs. The tutorial for each of these tools are given below.

Figure A Disease Finder

This tool provides all the genes reported for a major cardiovascular disease of interest.

S.No	Gene Symbol	HGNC ID	Gene Description
1	ABCA1	29	ATP-binding cassette, sub-family A (ABC1), member 1
2	ABCA4	34	ATP-binding cassette, sub-family A (ABC1), member 4
3	ABCB1	40	ATP-binding cassette, sub-family B (MDR/TAP), member 1
4	ABCC6	57	ATP-binding cassette, sub-family C (CFTR/MRP), member 6
5	ABCG1	73	ATP-binding cassette, sub-family G (WHITE), member 1
6	ABCG2	74	ATP-binding cassette, sub-family G (WHITE), member 2 (Junior blood group)
7	ABCG8	13887	ATP-binding cassette, sub-family G (WHITE), member 8
8	ABI1	11320	Abl-interactor 1
9	ABO	79	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
10	ACAT1	93	Acetyl-CoA acetyltransferase 1
11	ACE	2707	Angiotensin I converting enzyme
12	ACE2	13557	Angiotensin I converting enzyme 2
13	ACHE	108	Acetylcholinesterase (YT blood group)
14	ACP1	122	Acid phosphatase 1, soluble
15	ACPP	125	Acid phosphatase, prostate
16	ACTA1	129	Actin, alpha 1, skeletal muscle
17	ACTA2	130	Actin, alpha 2, smooth muscle, aorta
18	ACTB	132	Actin, beta
19	ACTC1	143	Actin, alpha, cardiac muscle 1
20	ACTG1	144	Actin gamma 1
21	ACTR2	169	ARP2 actin-related protein 2 homolog (yeast)
22	ACVRL1	175	Activin A receptor type II-like 1
23	ADA	186	Adenosine deaminase
24	ADAM10	188	ADAM metalloproteinase domain 10
25	ADAM17	195	ADAM metalloproteinase domain 17
26	ADAMTS1	217	ADAM metalloproteinase with thrombospondin type 1 motif, 1
27	ADAMTS12	14605	ADAM metalloproteinase with thrombospondin type 1 motif, 12
28	ADAMTS13	1366	ADAM metalloproteinase with thrombospondin type 1 motif, 13
29	ADAMTS3	219	ADAM metalloproteinase with thrombospondin type 1 motif, 3
30	ADAMTS4	220	ADAM metalloproteinase with thrombospondin type 1 motif, 4
31	ADAMTS7	223	ADAM metalloproteinase with thrombospondin type 1 motif, 7
32	ADAMTS9	13202	ADAM metalloproteinase with thrombospondin type 1 motif, 9

- 1) Click **Disease** tab
- 2) Select disease of interest
- 3) click **Search**
- 4) In results, click the gene symbol for more details

Figure B CVD GENE Finder

CVD gene helps the user to identify literature evidences for the gene of interest.

The screenshot displays the CardioGenBase website interface. The top navigation bar includes links for HOME, DISEASE, CVD GENE, GENE MAPPER, GENE EXPRESSION, DOCUMENTATION, and OUR TEAM. The CVD GENE tab is highlighted with a green arrow and the number 1. Below the navigation bar, the page title is "Find Genes Associated to Cardiovascular Diseases". The search form contains three fields: "Select a Disease:" (dropdown menu), "Entry Type:" (dropdown menu), and "Gene:" (text input). The "Find" button is located below the "Gene:" field. A yellow box on the right side of the search form, titled "CVD Gene", contains the following text: "CVD gene tool helps the user to identify literature evidences for the gene of interest. This tool provides molecular information such as gene description, ontology, literature, SNPs, protein interaction network, gene-drug interaction, molecular pathways, normal gene and protein expression in various tissues and body fluids." Green arrows and numbers 2, 3, 4, and 5 point to the "Select a Disease:", "Entry Type:", "Gene:" field, and the "Find" button, respectively.

The second screenshot shows the "Gene Report: CRP" page. The report is organized into several sections: "Gene", "Expression Profile", "SNP", "Networks", and "Pathways and Drugs". The "Gene" section displays the following information: "C-reactive protein, pentraxin-related", "HGNC ID : 2367", and "Chromosome Location : 1q23.2". The "Molecular Function" section lists: "GO:0005488~binding", "GO:0005509~calcium ion binding", and "GO:0005515~protein binding". The "Biological Process" section lists: "GO:0002250~adaptive immune response", "GO:0002252~immune effector process", and "GO:0002253~activation of immune response". The "Cellular Component" section lists: "GO:0005576~extracellular region", "GO:0005615~extracellular space", and "GO:0044421~extracellular region part". Below the report, there is a table with "PubMed ID" and "Abstract" columns. The "PubMed ID" column lists several IDs, with "9579251" highlighted in red. The "Abstract" column contains the following text: "Fifty percent of patients with coronary artery disease do not have any of the conventional risk factors. Prinzmetal's variant angina, primarily a vasospastic disease, is a glaring example of the gaps in our knowledge regarding the etiology of coronary heart disease. Half of all patients with coronary heart disease do not have any of the established coronary risk factors. Prinzmetal's variant angina, syndrome X, coronary embolization, and congenital coronary anomalies, are a few examples of conditions that may not be associated with established risk factors. New risk factors that are emerging in an attempt to establish an etiology in this group of patients are homocysteine plasma fibrinogen, estrogen-deficiency lipoprotein (a), C-reactive protein, Chlamydia pneumoniae, factor VII endogenous tissue plasminogen, and endogenous plasminogen activator/inhibitor type I. The battle against cardiovascular disease continues!" The "Journal Name" is listed as "Am J Crit Care" with the URL "http://www.pubmed.com/9579251".

- 1) Click **CVD GENE** tab
- 2) Select disease of interest
- 3) Choose entry type, Gene symbol or HGNC ID
- 4) Enter the gene
- 5) Click **Find** to retrieve result

The result includes molecular information such as gene description, ontology, literature, SNPs, protein interaction network, gene-drug interaction, molecular pathways, normal gene and protein expression in various tissues and body fluids.

Figure C Gene Mapper

Gene Mapper enables users to identify cardiovascular disease associated genes. Multiple query genes could be searched at once.

The screenshot displays the CardioGenBase website interface. The top navigation bar includes links for HOME, DISEASE, CVD GENE, GENE MAPPER, GENE EXPRESSION, DOCUMENTATION, and OUR TEAM. A green arrow labeled '1' points to the GENE MAPPER tab. Below the navigation bar, the text 'Search Cardiovascular Gene(s)' is followed by a search input field. A green arrow labeled '2' points to the input field, which contains the text '* Multiple Genes:'. Below the input field, a red button labeled 'Search Genes' is shown, with a green arrow labeled '3' pointing to it. A yellow box titled 'Gene Mapper' provides a description of the tool. The search results section shows 'Search Results!' and 'Your Search return 1 records.' A Venn diagram illustrates the overlap between 'Input Gene' (yellow circle, 3), 'Cardiovascular Gene' (light yellow circle, 1), and 'CardioGenBase' (grey circle, 1529). Below the Venn diagram is a table titled 'Cardiovascular Gene' with columns for S.No, Gene Symbol, HGNC ID, Gene Location, and No. of Articles.

S.No	Gene Symbol	HGNC ID	Gene Location	No. of Articles
1	A2M	7	12p13.31	4

- 1) click **Gene Mapper** Tab
- 2) Enter multiple genes separated by comma
- 3) Click **Search Genes** for results

The result show input list, disease gene as Venn diagram. Further, the number of articles for the each query gene is provided.

Figure D Gene Expression Finder

This tool enables users to identify the gene expression in various microarray experiment associated to cardiovascular disease conditions.

The screenshot displays the CardioGenBase website interface. The top navigation bar includes links for HOME, DISEASE, CVD GENE, GENE MAPPER, GENE EXPRESSION, DOCUMENTATION, and OUR TEAM. The 'GENE EXPRESSION' tab is highlighted with a green arrow labeled '1'. Below the navigation bar is a 'Search Expression' section with three dropdown menus: 'Select a Disease: -- Select --', 'Experiment Name: -- Select --', and 'Gene:'. A red 'Find Expression' button is located below these fields, with a green arrow labeled '5' pointing to it. To the right of the dropdown menus are green arrows labeled '2', '3', and '4'. Below the search section is a blue box titled 'Gene Expression' containing the text: 'This tool enables users to identify the gene expression in various microarray experiment associated to cardiovascular disease conditions.'

The bottom section of the screenshot shows the 'Result:' page. It features a 'Probeset Id:' dropdown menu with '205753_at' selected. Below this is a bar chart comparing 'Patient' and 'Control' expression levels. The x-axis represents intensity, ranging from 11.4 to 12.2. The 'Patient' bar is green and has a low intensity, while the 'Control' bar is blue and has a high intensity. A tooltip for the 'Control' bar indicates an 'Avg Intensity: 12.172146'.

Experiment Details:

- ID** : GSE13985
- Title** : Atherosclerotic markers in human blood - a study in patients with familial hypercholesterolemia
- Type** : Expression profiling by array
- Design** : Five patients diagnosed with Familial hypercholesterolemia and five age, sex, BMI and smoking status matched controls contributed blood from which total RNA from white blood cells was isolated. RNA samples were analyzed using Affymetrix microarrays and two groups were compared for differentially expressed genes.
- Contributors**: Rezen T, Cvikl A, Brecelj N, Rozman D, Keber I, Fon Tacer K
- Platform** : GPL570 [HG-U133_Plus_2] Affymetrix Human Genome U133 Plus 2.0 Array
- Link** : <http://www.ncbi.nlm.nih.gov/geo/query/acc.cgi?acc=GSE13985>

- 1) Click **Gene Expression** tab
- 2) Choose a disease
- 3) Select a experiment of interest
- 4) Enter a gene symbol
- 5) Click **Find Expression**