

GSLC Computational Biology Sesi 9

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Kelas : LP01

Berdasarkan video PPT Bioinformatics Database (sesi 8) slide ke 19

(<https://youtu.be/RPyhYraPcog?si=0bTW4agTxOt8A4Zt>) tentang cara mengakses data dan mencari nukleotida di GenBank NCBI, kita dapat melakukan beberapa langkah berikut:

1. Akses link berikut terlebih dahulu: <https://www.ncbi.nlm.nih.gov/>.

The screenshot shows the official website of the United States government (NIH) at www.ncbi.nlm.nih.gov. The page features a dark blue header with the NIH logo and the text "National Library of Medicine" and "National Center for Biotechnology Information". On the left, there's a sidebar with a "Resource List (A-Z)" menu. The main content area has sections for "Welcome to NCBI", "Popular Resources" (including PubMed, Bookshelf, PubMed Central, BLAST, Nucleotide, Genome, SNP, Gene, Protein, PubChem), and "NCBI News & Blog". There are also sections for "Submit", "Download", "Learn", "Develop", "Analyze", and "Research", each with a corresponding icon.

2. Sekarang kita akan ganti database nya menjadi gene lalu kita masukkan nama gene yang kita ingin cari. Disini saya akan gunakan ACE2 (Angiotensin-Converting Enzyme 2) karena gen ini memiliki peran penting dalam sistem kardiovaskular dan menjadi sangat relevan dalam studi virologi, khususnya sejak pandemi COVID-19. ACE2 merupakan reseptor utama yang digunakan oleh virus SARS-CoV-2 untuk masuk ke dalam sel manusia.

Gene	ACE2	<input type="button" value="X"/>
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GENE

[ACE2 – angiotensin converting enzyme 2](#)

Homo sapiens (human)

Also known as: ACEH

Gene ID: 59272

clear

New - Visualize gene across multiple species

RefSeq Sequences

Full Report ▾

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ACE2 angiotensin converting enzyme 2 [*Homo sapiens* (human)]

Gene ID: 59272, updated on 3-May-2025

Summary

Official Symbol ACE2 provided by HGNC
 Official Full Name angiotensin converting enzyme 2 provided by HGNC
 Primary source HGNC HGNC:13567
 See related Ensembl ENSG00000130234 MIM 300335; AllianceGenome HGNC:13567
 Gene type protein coding
 RefSeq status REVIEWED
 Organism *Homo sapiens*
 Lineage Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Primates; Haplorrhini; Catarrhini; Hominoidea; Homo
 Also known as ACEH
 Summary The protein encoded by this gene belongs to the angiotensin-converting enzyme family of dipeptidyl carboxypeptidase and has considerable homology to human angiotensin 1 converting enzyme. This secreted protein catalyzes the cleavage of angiotensin I into angiotensin 1-9, and angiotensin II into the vasoconstrictor angiotensin 1-7. ACE2 is known to be expressed in various human organs, and its organ- and cell-specific expression suggests that it may play a role in the regulation of cardiovascular and renal function, as well as fertility. In addition, the encoded protein is a functional receptor for the spike glycoprotein of the human coronavirus HCoV-NL63 and the human severe acute respiratory syndrome coronaviruses, SARS-CoV and SARS-CoV-2, the latter is the causative agent of coronavirus disease-2019 (COVID-19). Multiple splice variants have been found for this gene and the ACE2 (or MIRb-ACE2) splice variant has been found to be interferon inducible. [provided by RefSeq, Nov 2020]

Note: This gene has been reviewed for its involvement in coronavirus biology, and is involved in SARS-CoV-2 infection.

Annotation information

Expression Biased expression in small intestine (RPKM 93.7), duodenum (RPKM 69.0) and 5 other tissues [See more](#)

Orthologs [mouse](#) [all](#)

NEW Try the new [Gene table](#)
Try the new [Transcript table](#)

Genomic context

Location: Xp22.2
Exon count: 22

See ACE2 in [Genome Data Viewer](#)

Annotation release	Status	Assembly	Chr	Location
RS_2024_08	current	GRCh38.p14 (GCF_000001405.40)	X	NC_000023.11 (15518197..15607211, complement)
RS_2024_08	current	T2T-CHM13v2.0 (GCF_009914755.1)	X	NC_060947.1 (15101170..15190203, complement)
RS_2024_09	previous assembly	GRCh37.p13 (GCF_000001405.25)	X	NC_000023.10 (15536320..15625334, complement)

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- Genomic regions, transcripts, and products
- Expression
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- Phenotypes
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- Interactions
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 - Markers, Clone Names, Homology, Gene Ontology
- General protein information
- NCBI Reference Sequences (RefSeq)
- Related sequences
- Additional links
- Locus-specific Databases

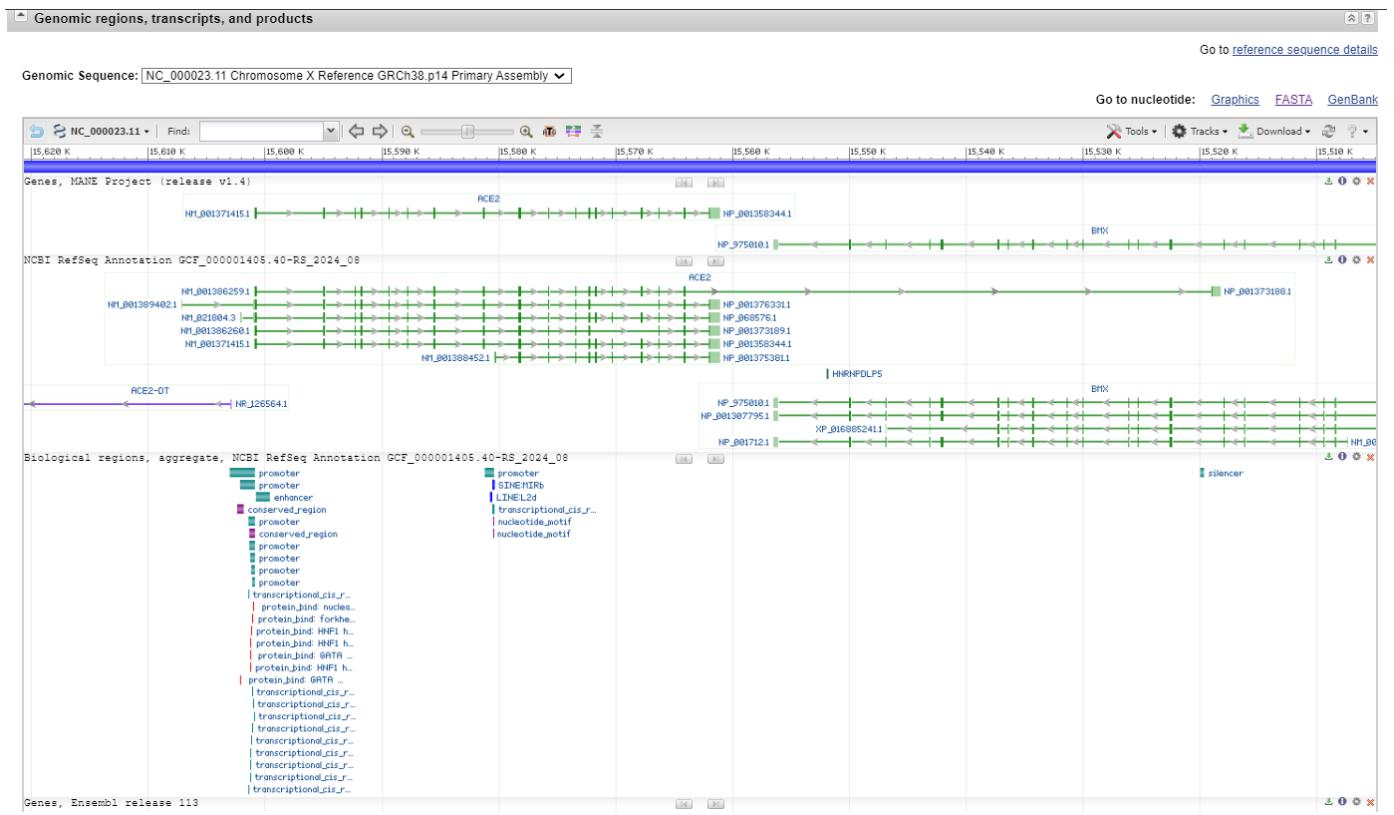
Genome Browsers

- Genome Data Viewer
- Variation Viewer (GRCh37.p13)
- Variation Viewer (GRCh38)
- Ensembl
- UCSC

Related information

- 3D structures

3. Pergi ke reference sequence details.



4. Sekarang kita pergi saja ke mRNA and Proteins yang pertama (angiotensin-converting enzyme 2 isoform 1 precursor).

NCBI Reference Sequences (RefSeq)

NEW Try the new [Transcript table](#)

RefSeqs maintained independently of Annotated Genomes

These reference sequences exist independently of genome builds. [Explain](#)

Genomic

1. NG_012575.3 RefSeqGene

Range 11251..51178
Download [GenBank](#), [FASTA](#), [Sequence Viewer](#) ([Graphics](#))

mRNA and Protein(s)

1. [NM_001371415.1](#) → [NP_001358344.1](#) angiotensin-converting enzyme 2 isoform 1 precursor

Status: REVIEWED

Description	Transcript Variant: This variant (1) encodes the longest isoform (1). Variants 1 and 2 encode the same isoform.
Source sequence(s)	AC097625
Consensus CDS	CCDS14169.1
UniProtKB/Swiss-Prot	A0A7D6JAD5 , C7ECU1 , Q6UWP0 , Q86WT0 , Q9BYF1 , Q9NR47 , Q9UFZ6
UniProtKB/TrEMBL	A0A8S0M502 , B2RCJ5
Related	ENSP00000252519.3 , ENST00000252519.8

Conserved Domains (2) [summary](#)

pfam01401 Location:19 → 606	Peptidase_M2; Angiotensin-converting enzyme
pfam16959 Location:617 → 770	Collectrin; Renal amino acid transporter

5. Sekarang kita klik saja FASTA untuk melihat Sequence nya.

Nucleotide Nucleotide Advanced

GenBank ▾ Send to: ▾ Change region shown

Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript variant 1, mRNA

NCBI Reference Sequence: NM_001371415.1

FASTA Graphics

Go to: ▾

Locus: NM_001371415 3339 bp mRNA linear PRI 27-MAR-2025

Definition: Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript variant 1, mRNA.

Accession: NM_001371415

Version: NM_001371415.1

Keywords: RefSeq; MANE Select.

Source: Homo sapiens (human)

Organism: [Homo sapiens](#)

Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euchondrolires; Primates; Haplorrhini; Catarrhini; Hominoidea; Homo.

Reference: 1 (bases 1 to 3339)

Authors: Do,T.L., Tachibana,K., Yamamoto,N., Ando,K., Isoda,T. and Kihara,T.

Title: Interaction of SARS-CoV-2 Spike protein with ACE2 induces cortical actin modulation, including dephosphorylation of ERM proteins and reduction of cortical stiffness

Journal: Hum Cell 38 (1), 3 (2024)

PubMed: [39436480](#)

Remark: GeneIF: Interaction of SARS-CoV-2 Spike protein with ACE2 induces cortical actin modulation, including dephosphorylation of ERM proteins and reduction of cortical stiffness.
Publication Status: Online-Only

Reference: 2 (bases 1 to 3339)

Authors: Thiede,J.M., Dick,J.K., Jarjour,N.N., Krishna,V.D., Qian,L., Sangala,J., Benzow,K., Karanjeet,K., Chin,S., Rainwater,O., Cheenan,M.C., Hogquist,K.A., Jameson,S.C., Hart,G.T., Bold,T.D. and Koob,M.D.

Analyze this sequence Run BLAST
Pick Primers
Highlight Sequence Features
Find in this Sequence
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Articles about the ACE2 gene

Tight junction protein LSR is a host defense factor against SARS-CoV-2 infec [EMBO J. 2024]
Interaction of SARS-CoV-2 Spike protein with ACE2 induces cortical actin mod [Hum Cell. 2024]
Protein Nanoparticles for Targeted SARS-CoV-2 Trapping and Neutraliz [Adv Health Mater. 2025]

See all...

Reference sequence information

RefSeq alternative splicing
See 6 reference mRNA sequence splice variants for the ACE2 gene.

RefSeq protein product
See the reference protein sequence for angiotensin-converting enzyme 2 isoform 1

Nucleotide Nucleotide Advanced

FASTA ▾ Send to: ▾ Change region shown

Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript variant 1, mRNA

NCBI Reference Sequence: NM_001371415.1

GenBank Graphics

NM_001371415.1 Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript variant 1, mRNA

```
AGCTTACGGAAAGTCATTCACTGATGATCTGGCTCACAGGGACGATGTCAGCTCTCTGGCTC
CTTCAGCCTTGTCTGTACTCTGTCAGTCGTTGACCATTCAGGAACAGGCAGAACATTGGACA
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AGCAAAATGGCTTCTAGTCAGTCAGAACAGAACAGCAACGGTTGACACAATTTAAATACAATGAG
CACCATTCAGCTAGTGGAAAGTTGTAACCCAGATAATCACAAGGAATGCTTAACTCTGAAACAGGT
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TCATTGCTTGTGATATGGGGTAGATTGGACAAATCTGTTACTCTTGTGACAGTCCCCCTTGGACAG
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TGTGACCCCGCATCTGTGTTCTGATTTCAATGATTACTCATTCATTGATATTACAAGGACCTT
ACCAATTCTTCAAGGAGCTTCTGACAGTCAGTCACAGGCTTCTGACAGCTGAT
```

Analyze this sequence Run BLAST
Pick Primers
Show in Genome Data Viewer

Articles about the ACE2 gene

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Interaction of SARS-CoV-2 Spike protein with ACE2 induces cortical actin mod [Hum Cell. 2024]
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See all...

Reference sequence information

RefSeq alternative splicing
See 6 reference mRNA sequence splice variants for the ACE2 gene.

RefSeq protein product
See the reference protein sequence for

6. Terakhir kita tinggal mendownloadnya (send to) lalu pilih format nya dalam FASTA, nantinya kita dapat melihat isi file FASTA tersebut menggunakan notepad.

FASTA ▾

Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript variant 1, mRNA

NCBI Reference Sequence: NM_001371415.1

[GenBank](#) [Graphics](#)

>NM_001371415.1 Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript variant 1, mRNA

```
AGTCTAGGGAAAGTCATTCACTGGATGTGATCTGGCTCACAGGGGACGATGTCAGCTCTGGCTC  
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```

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```
>NM_001371415.1 Homo sapiens angiotensin converting enzyme 2 (ACE2), transcript  
variant 1, mRNA  
AGTCTAGGGAAAGTCATTCACTGGATGTGATCTGGCTCACAGGGGACGATGTCAGCTCTGGCTC  
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