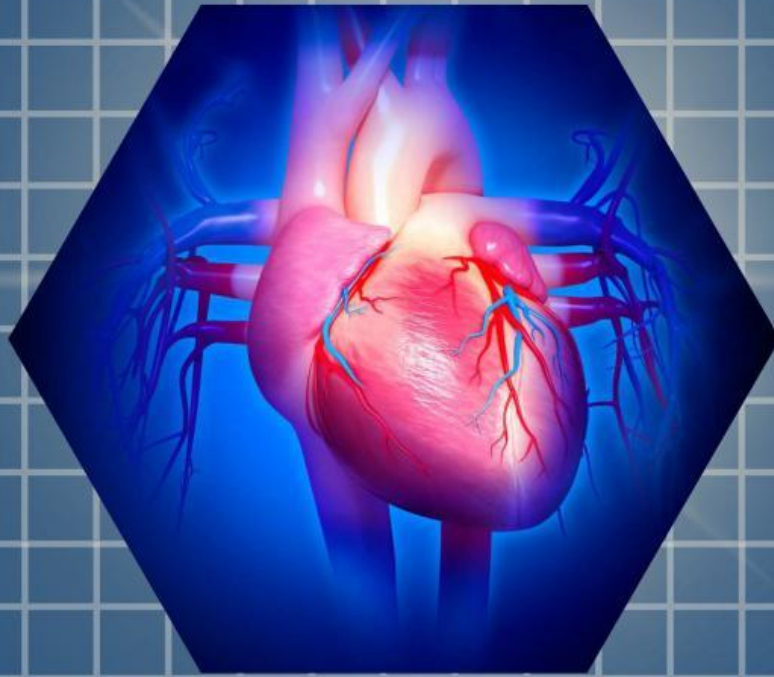


Kardiovascular Disease



Group :

Group Members :

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

A. Introduction

Questions

Expected Answer

What do you know about genetics?

What diseases can be caused by genetic factors?

Do you know about hypertension?

What factors can cause a person to develop hypertension?

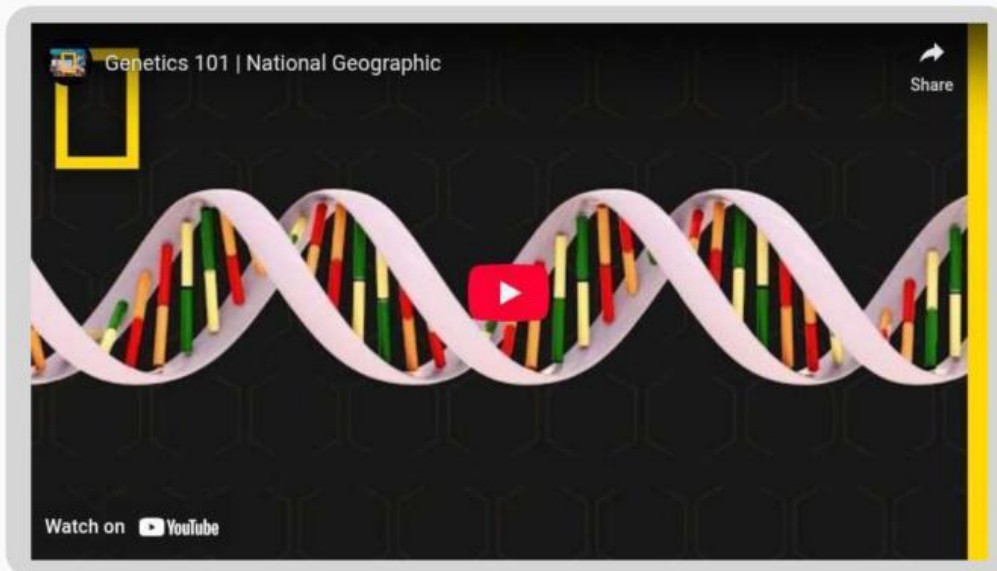
Do you know that one of the causes of hypertension is exposure to aromatic chemical substances? Give the explanation!

What are the serious complications that can arise from uncontrolled high blood pressure?

Now, let's watch a video genetics and hypertension

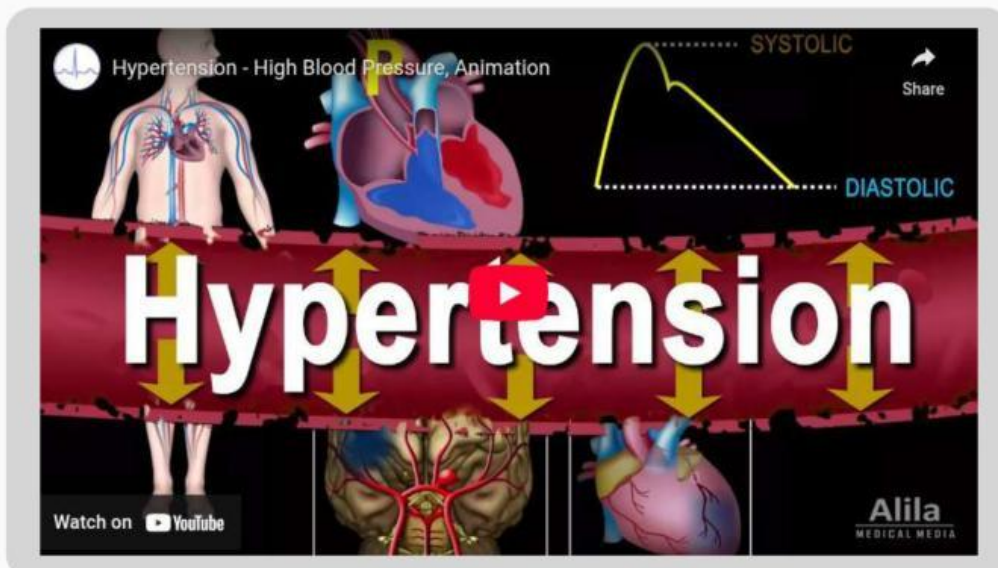
a). Genetics

<https://youtu.be/v8tJGlicgp8?si=JlCn0P61yEz5JL8m>



b). Hypertension

<https://youtu.be/JtBtk00EiVM?si=W86YyjZsfpACfBYS>



B. Investigations

A 40-year-old woman who worked in the textile industry for 15 years complained of progressive shortness of breath, easy fatigue and swelling of the lower limbs. Her work history involved continuous exposure to aromatic amine chemicals used in the fabric dyeing process.

On physical examination, signs of pulmonary arterial hypertension (HAP) such as a loud second heart sound and enlarged jugular veins were found. Echocardiographic examination and right heart catheterization confirmed elevated pulmonary artery pressure (mPAP > 25 mmHg) with increased pulmonary vascular resistance.

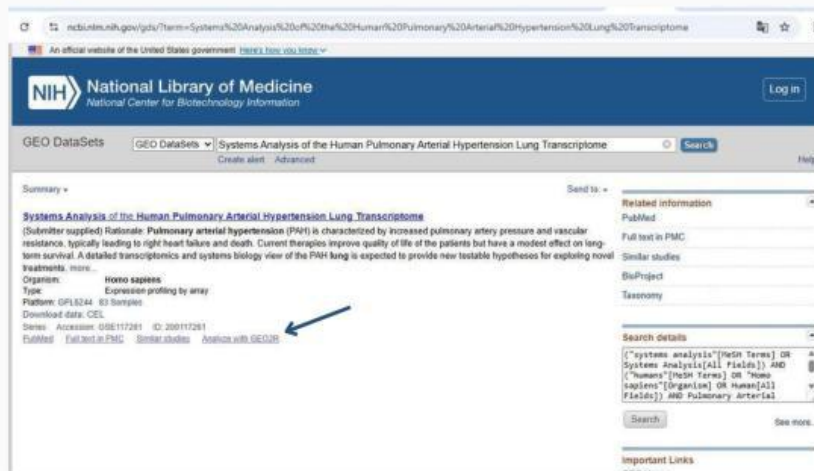
Using GEO (Gene Expression Omnibus)

1. Access the NCBI GEO link: <https://www.ncbi.nlm.nih.gov/geo/>
2. Enter the keywords "Systems Analysis of the Human Pulmonary Arterial Hypertension Lung Transcriptome" in the search field.

The screenshot shows the NCBI GEO homepage. At the top, there's a navigation bar with links like 'Beranda GEO', 'Dokumentasi', 'Menanyakan & Menjelajahi', and 'Surel GEO'. The main heading is 'Omnibus Ekspresi Gen'. Below it, a brief description of GEO as a public repository for functional genomics data is provided. A search bar with the placeholder 'Kata Kunci atau Akses GEO' and a 'Mencari' button is visible. The page is divided into three main columns: 'Memulai' (Getting Started), 'Peralatan' (Tools), and 'Telusuri Konten' (Browse Content). The 'Memulai' column includes links like 'Ringkasan', 'Tanya Jawab Umum', 'Tentang GEO DataSets', 'Tentang Profil GEO', 'Tentang Analisis GEO2R', 'Cara Membuat Query', and 'Cara Mengunduh Data'. The 'Peralatan' column lists 'Pencarian Studi di GEO DataSets', 'Pencarian Ekspresi Gen di Profil GEO', 'Pencarian Dokumentasi GEO', 'Menganalisis Studi dengan GEO2R', 'Studi dengan Jejak Penampil Data Genom', 'Akses Terprogram', 'Situs FTP', and 'Daftar dan Trek Data ENCODE'. The 'Telusuri Konten' column features a 'Peramban Repositori' section with a table showing statistics: 'Kumpulan Data: 4348', 'Seri: 254295', 'Peron: 27351', and 'Sampel: 7818925'. At the bottom, there's an 'Informasi untuk Pengirim' section with links for 'Masuk untuk Kirim', 'Pedoman Pengajuan', 'Standar MIAME', 'Pedoman Pembaruan', and 'Mengutip dan Menautkan ke GEO'.

3. Select the search result

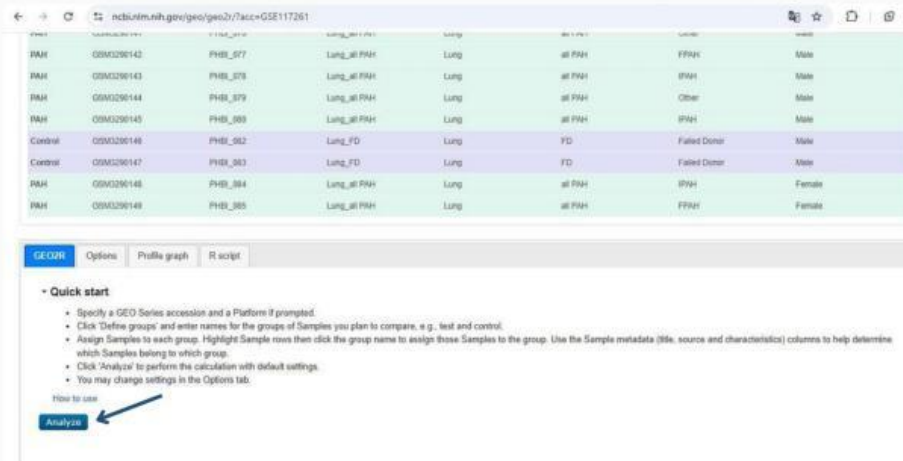
4. Click the “Analyze with GEO2R” button



5. Select “Define Groups”, then create 2 groups namely PAH and Control. The PAH group contains infected patients while the control group contains healthy patients.

6. Group each group by source name. “Lung_all PAH” is grouped in the PAH group, while “Lung_FD” is grouped in the control group.

7. After everything is grouped, the data is analyzed by clicking “Analyze”



8. Results can be seen in visualizations and tables.

9. Note the following to be able to identify:

Column	Explanation
Gene.symbol	Gene name
logFC (log Fold Change)	Change value of gene expression. - Positive: gene up (overexpressed) - Negative: gene down (underexpressed)

To read the logFC consider the following criteria:

- $\logFC > 1 \rightarrow$ Genes are expressed higher in the patient (e.g. proinflammatory genes).
- $\logFC < -1 \rightarrow$ Genes are expressed lower in patients (e.g. protective genes such as vasodilators).

10. Analyse the results through the data from the table to determine the relationship between genes and cases. Analyse the data referring to the gene names viz: EDN1, PDGFB, BMPR2, NOS3. Analyse by reading the logFC according to the criteria in the previous point. Provide an explanation of the meaning of the logFC results of these genes by relating them to the case.

Fill in the column below based on the investigation results!

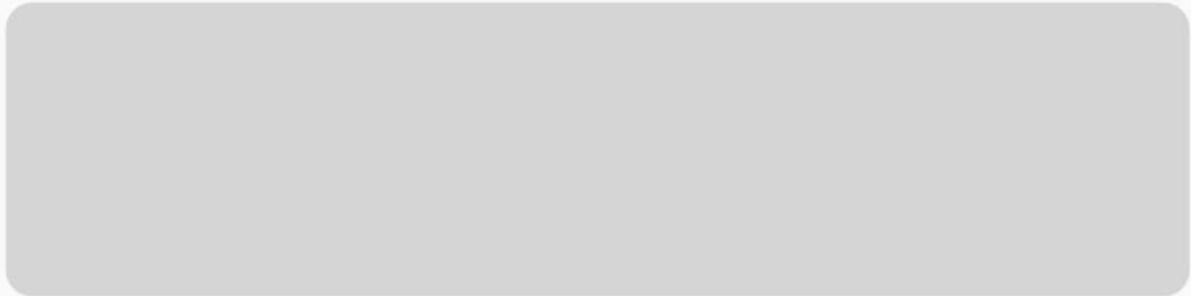
Gene	logFC	Gene Explanation
BMPR2		
EDN1		
NOS3		
PDGFB		

Answer the questions below by linking to the previous answers!

1. What happens if the EDN1 gene is overexpressed in the lung?



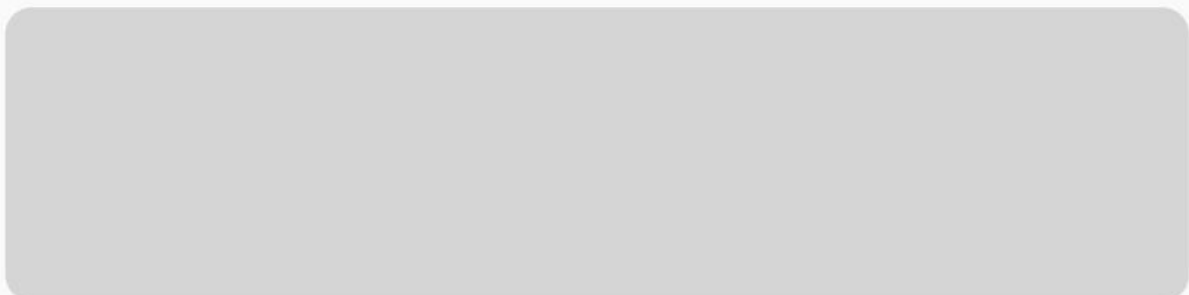
2. Why is the BMPR2 gene important for keeping blood vessels healthy?



3. What happens if the NOS3 gene is decreased and the body lacks nitric oxide (NO)?



4. The PDGFB gene is increased in HAP patients. What do you think will happen if this gene makes the lung blood vessel walls thicker?



Please answer the following questions again

Questions

Expected Answer

What do you know about genetics?

What diseases can be caused by genetic factors?

Do you know about hypertension?

What factors can cause a person to develop hypertension?

Do you know that one of the causes of hypertension is exposure to aromatic chemical substances? Give the explanation!

What are the serious complications that can arise from uncontrolled high blood pressure?