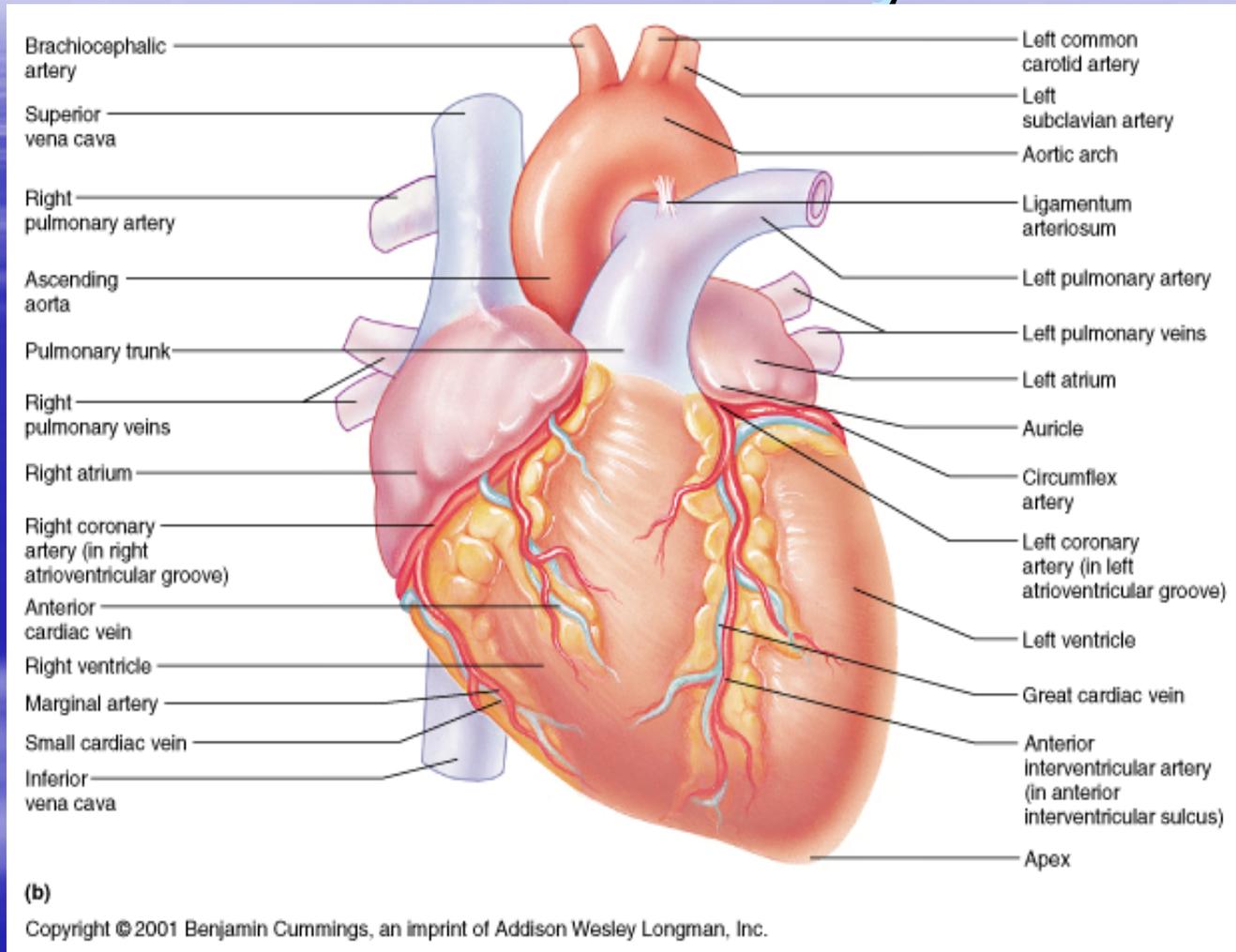


# Effect Of Elements In The Cardiovascular System

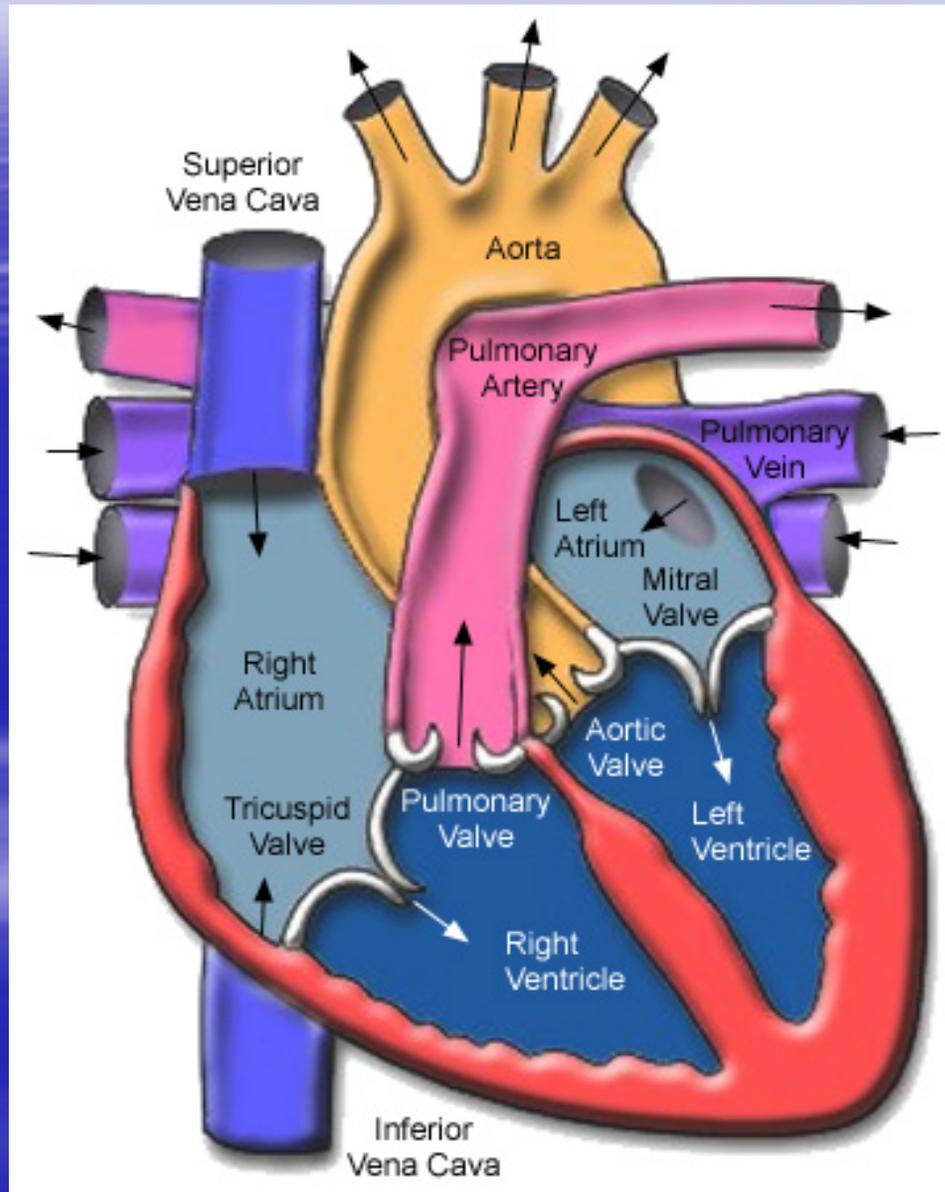


Luz I. del Valle, Carmen Flores and Erika Carrasquillo

# Effect of the Elements

**Elements are an essential part of our nutrition but the effect on the cardiovascular system can also be dangerous and irreversible.**

# Heart And Vessels

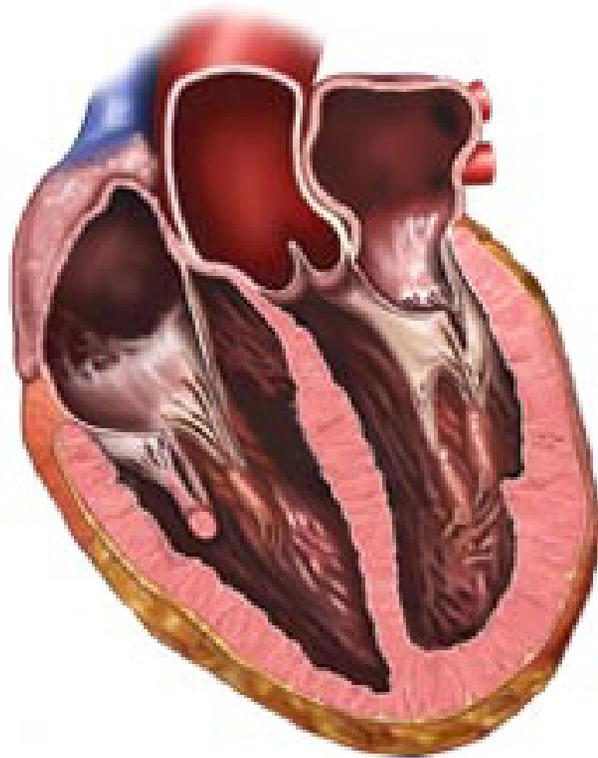


# Cardiovascular Disorders

## Cardiomyopathy

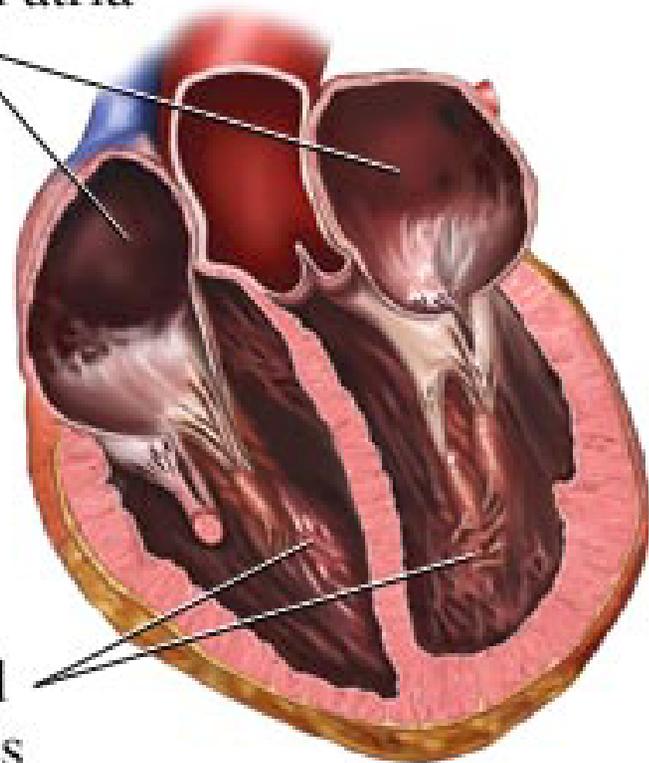
### Selenium Deficiency

- ♥ Keshan disease vs dilated cardiomyopathy- multifocal necrosis and replacement fibrosis of the myocardium
- ♥ Kashin-beck disease- deforming arthritis



Normal heart  
(cross section)

Enlarged atria



Enlarged  
ventricles

Enlarged heart

# DILATED CARDIOMYOPATHY

# Cardiovascular Disorders

## Cardiomyopathy

### **Cobalt toxicity**

- ♥ Cardiomyopathy- greater myofibrillar loss and atrophy and less fibrosis and myocyte hypertrophy

# Cardiovascular Disorders

## Cardiomyopathy

### **Mercury-induced cardiomyopathy**

- ♥ Dilated cardiomyopathy

  - ♥ Thousand-fold elevation of mercury in heart tissue.

### **Arsenic toxicity**

- ♥ Acute arsenic toxicity

  - ♥ Toxic myocarditis

- ♥ Chronic exposure to arsenic

  - ♥ Chronic cardiomyopathy (small vessel disease and interstitial inflammation with fibrosis)

# Cardiovascular Disorders

## Cardiomyopathy

### **Iron overload**

- ♥ Mainly seen in patients with hemosiderosis or primary hemochromatosis

### **Aluminum toxicity**

- ♥ Patients with end-stage renal disease with cardiac hypertrophy.

# Cardiovascular Disorders

## Atherosclerosis

### Iron Excess

- ♥ Experimental data supports the role of iron in the process of lipid peroxidation which is hypothesized to be involved in early stages of atherosclerosis.

# Cardiovascular Disorders

## Atherosclerosis

### Selenium deficiency

- ♥ May be related to increased oxidative stress or increased platelet aggregation.
- ♥ Low levels of selenium are associated with coronary stenosis.

# Cardiovascular Disorders

## Atherosclerosis

### Magnesium

- ♥ Low levels of magnesium and fluoride in drinking water were found to be associated with increased risk for acute myocardial infarction.

### Calcium

- ♥ Is frequently deposited in the extracellular matrix of advanced atherosclerotic plaques.

# Cardiovascular Disorders

## Hypertension

### Lead

- ♥ Increased vascular responsiveness to catecholamine mediated effects on calcium channels.
- ♥ Increased expression of endothelia and generation of reactive oxygen species.

# Cardiovascular Disorders

## Hypertension

### Mercury

- ♥ Few data suggest that chronic low-level exposure to mercury is an etiologic factor in essential hypertension.

# Chemical Substances Detected in Soil in Puerto Rico

<b>Chemical Substance</b>	<b>Gamma (ppm)</b>	<b>Percent (ppm)</b>
<b>Aluminum</b>	<b>NM</b>	<b>NM</b>
<b>Calcium</b>	<b>500-200,000</b>	<b>15,200</b>
<b>Barium</b>	<b>20-5,000</b>	<b>617</b>
<b>Cobalt</b>	<b>5-1,500</b>	<b>31.4</b>
<b>Iron</b>	<b>7,000-200,000</b>	<b>55,500</b>
<b>Magnesium</b>	<b>500-100,000</b>	<b>12,700</b>
<b>Selenium</b>	<b>NM</b>	<b>NM</b>
<b>Zinc</b>	<b>6-700</b>	<b>113</b>

Fuentes:  
CH2MHILL 2001  
Marsh 1992  
NM = no sample

Elements are an essential part of our nutrition. The exposure to some of them can harm our health. It's important to identify the risk and prevent unnecessary exposure.

Thanks for your attention

Any Questions?