In [1]:
```
print('Name:Shikha ')
print('Plot a heatmap which help you visualize percentage of blood leaving the heart at each contraction of a smoking and non smoking person heart')
print('Plot a heatmap which help you visualize Percentage of blood leaving the heart at each contraction of person who died due to cardio vascular disease')
```

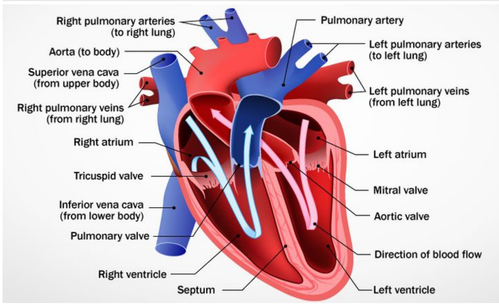
```
Name:Shikha
Plot a heatmap which help you visualize percentage of blood leaving the heart at each contraction of a smoking and non smoking person heart
Plot a heatmap which help you visualize Percentage of blood leaving the heart at each contraction of person who died due to cardio vascular disease
```

Task 1 - Plot heat map to visualize percentage of blood leaving the heart at each contraction of a smoking and non smoking person

A normal, healthy heart will never completely empty, but it will pump out 55-70 percent of the blood that's inside it. An ejection fraction of 55-70 percent is normal; 40-55 percent is below normal. Anything less than 40 percent may indicate heart failure, and below 35 percent there's a risk for life-threating arrhythmias

In [2]:
```
#predefine code for image
from IPython.display import Image
Image(filename='heart.png')
#predefine code end
```

Out[2]:



The right side of your heart receives oxygen-poor blood from your veins and pumps it to your lungs, where it picks up oxygen and gets rid of carbon dioxide. The left side of your heart receives oxygen-rich blood from your lungs and pumps it through your arteries to the rest of your body.

In [3]:
```
# Import all the libraries and read heart_failure_clinical_records_dataset.csv
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

dataframe = pd.read_csv('heart_failure_clinical_records_dataset.csv')
dataframe
```

Out[3]:

	age	anaemia	creatinine_phosphokinase	diabetes	ejection_fraction	high_blood_pressure	platelets	serum_creatinine	serum_sodium	sex	smoking	time	DEATH_EVENT
0	75.0	0	582	0	20	1	265000.00	1.9	130	1	0	4	1
1	55.0	0	7861	0	38	0	263358.03	1.1	136	1	0	6	1
2	65.0	0	146	0	20	0	162000.00	1.3	129	1	1	7	1
3	50.0	1	111	0	20	0	210000.00	1.9	137	1	0	7	1
4	65.0	1	160	1	20	0	327000.00	2.7	116	0	0	8	1
...	...	...	...	...	...	...	...	...	...	...	...	...	...
294	62.0	0	61	1	38	1	155000.00	1.1	143	1	1	270	0
295	55.0	0	1820	0	38	0	270000.00	1.2	139	0	0	271	0
296	45.0	0	2060	1	60	0	742000.00	0.8	138	0	0	278	0
297	45.0	0	2413	0	38	0	140000.00	1.4	140	1	1	280	0
298	50.0	0	196	0	45	0	395000.00	1.6	136	1	1	285	0

299 rows × 13 columns

In [6]:
```
#Group by age and smokers and find the average ejection_fraction rate
smoking_heart_dataframe = dataframe.groupby(['age','smoking'])['ejection_fraction'].mean().reset_index()
smoking_heart_dataframe
```

Out[6]:

	age	smoking	ejection_fraction
0	40.0	0	37.000000
1	40.0	1	35.000000
2	41.0	1	40.000000
3	42.0	0	38.750000
4	42.0	1	31.666667
...	...	...	...
70	87.0	0	38.000000
71	90.0	0	44.000000
72	90.0	1	40.000000
73	94.0	0	38.000000
74	95.0	0	35.000000

75 rows × 3 columns

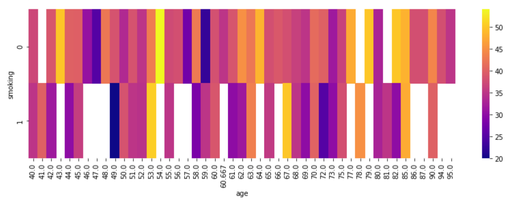
In [7]:
```
# Plot a heatmap to show the ejection fraction rate in smokers and non smokers heart
plt.figure(figsize=(14,4))

heatmap_df = pd.pivot_table(values ='ejection_fraction', index ='smoking',
                    columns ='age', data = smoking_heart_dataframe)

sns.heatmap(heatmap_df, cmap ='plasma')
```

Out[7]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1e7310e4790>
```



0 are non smokers and 1 are smokers

Conclusion - The heart of the people who smoke releases less percentage of blood at each contraction that of non smoking people

Task 2 Plot a heatmap to visualize percentage of blood leaving the heart at each contraction of people who died due to cardio vascular disease

In [8]:
```
#Group by death events and ejection fraction rate and find the average ejection fraction rate
death_dataframe = dataframe.groupby(['age','DEATH_EVENT'])['ejection_fraction'].mean().reset_index()
death_dataframe
```

Out[8]:

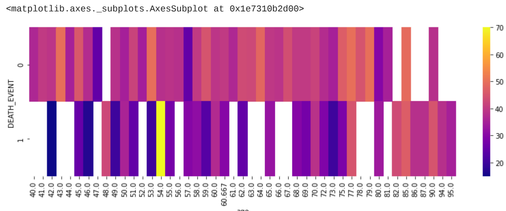
	age	DEATH_EVENT	ejection_fraction
0	40.0	0	36.428571
1	41.0	0	40.000000
2	42.0	0	39.166667
3	42.0	1	15.000000
4	43.0	0	50.000000
...	...	...	...
68	87.0	1	38.000000
69	90.0	0	38.000000
70	90.0	1	45.000000
71	94.0	1	38.000000
72	95.0	1	35.000000

73 rows × 3 columns

In [9]:
```
# Plot a heatmap to show the ejection fraction rate of people who died due to cardio vascular disease
plt.figure(figsize=(14,4))
heatmap_df = pd.pivot_table(values ='ejection_fraction', index ='DEATH_EVENT',
                    columns ='age', data = death_dataframe)
sns.heatmap(heatmap_df, cmap ='plasma')
```

Out[9]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1e7310b2d00>
```



1 are people died due to cardiovascular disease

Conclusion - The heart of people who died due to cardiovascular disease releases less percentage of blood at each contraction

In [ ]:
```
```