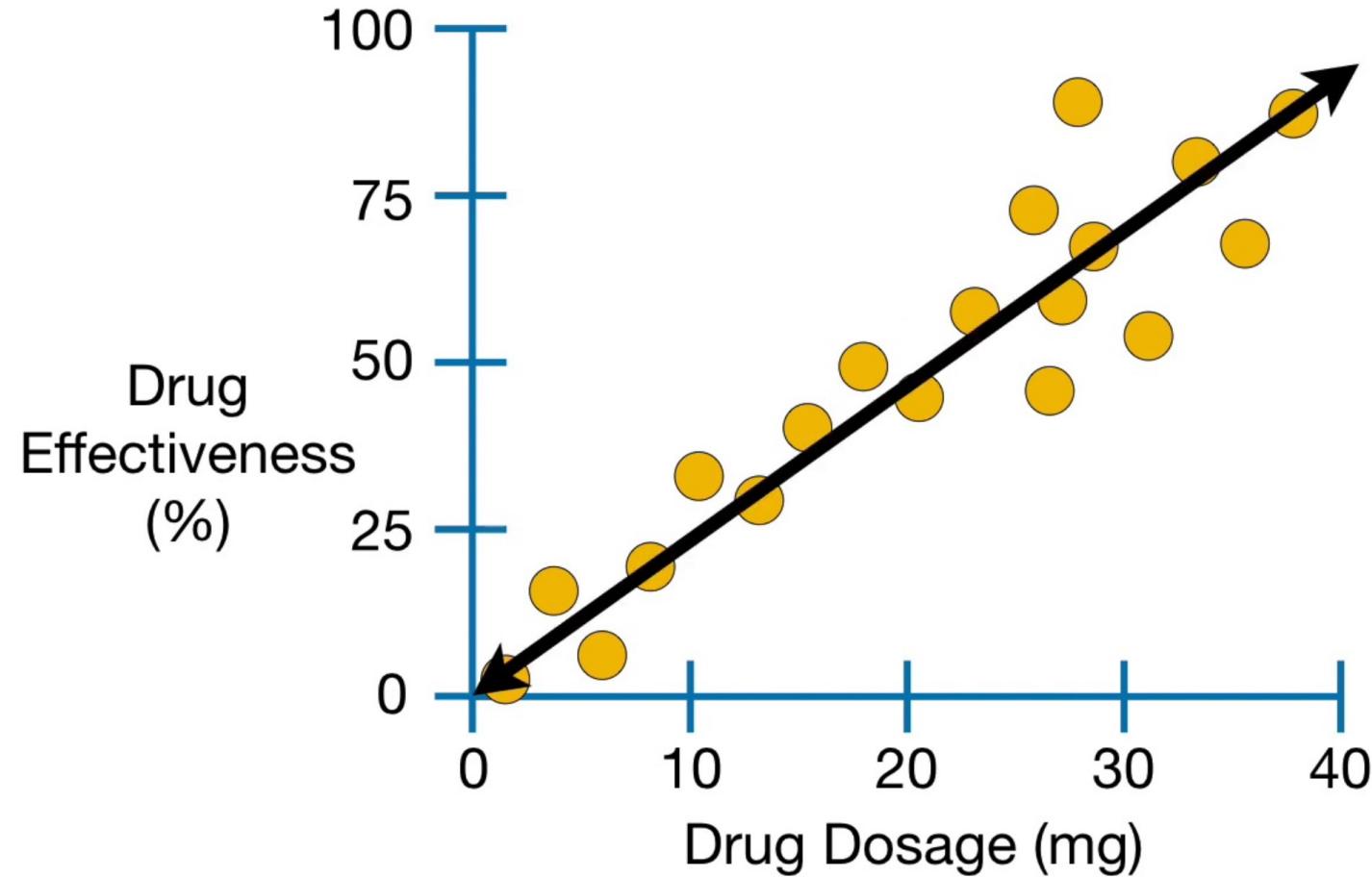
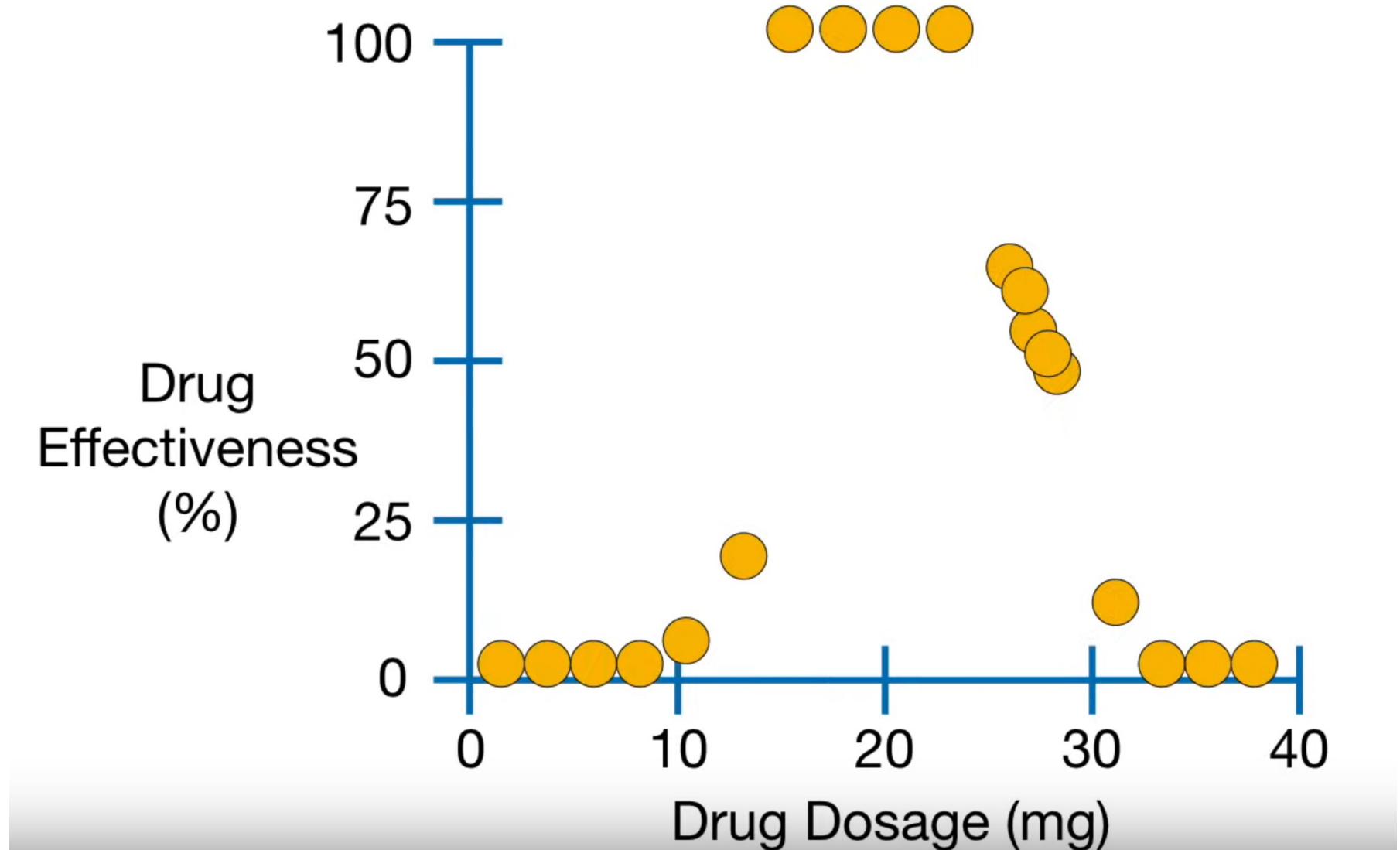


Regression Tree

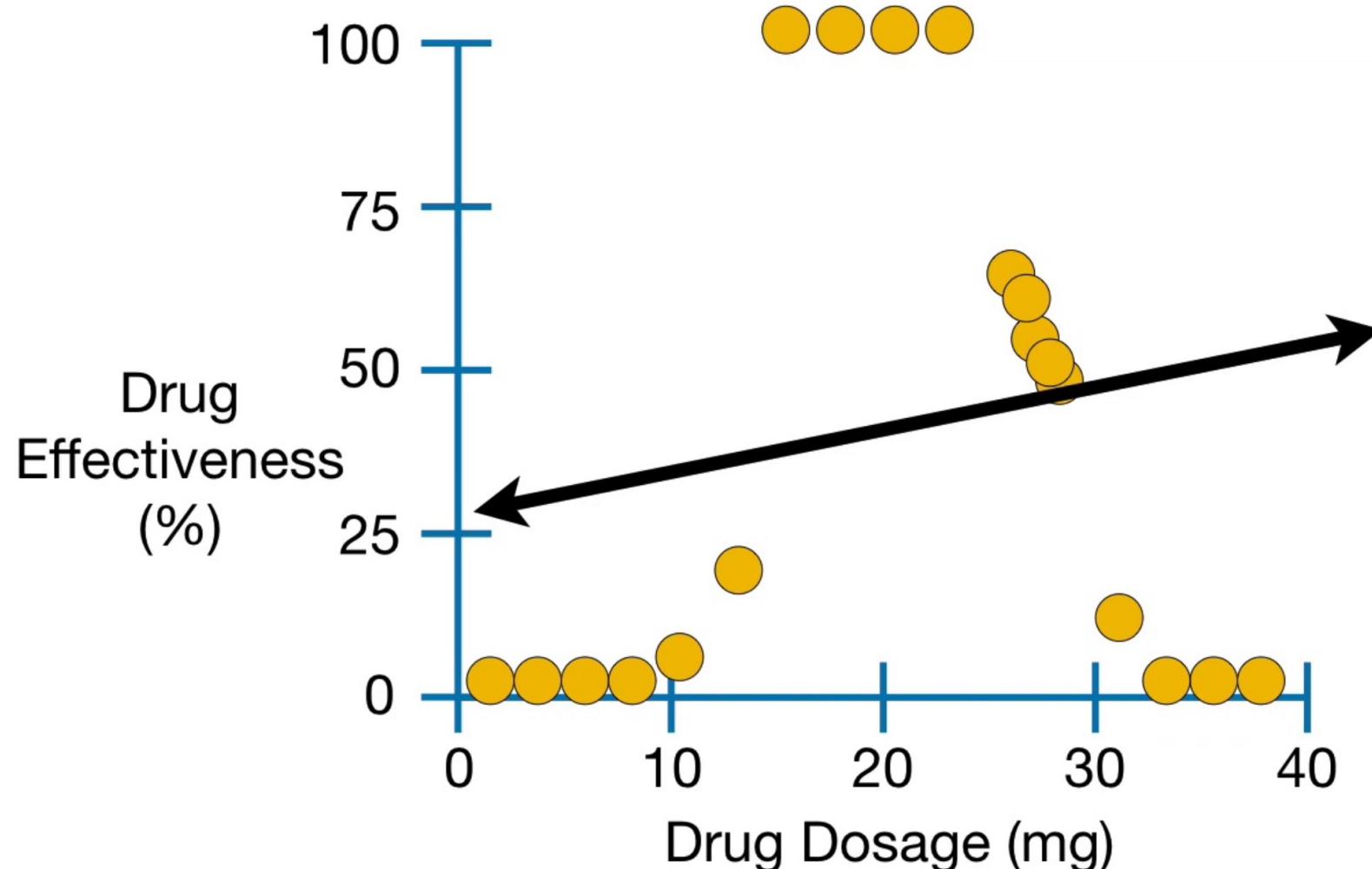
Linear Regression model



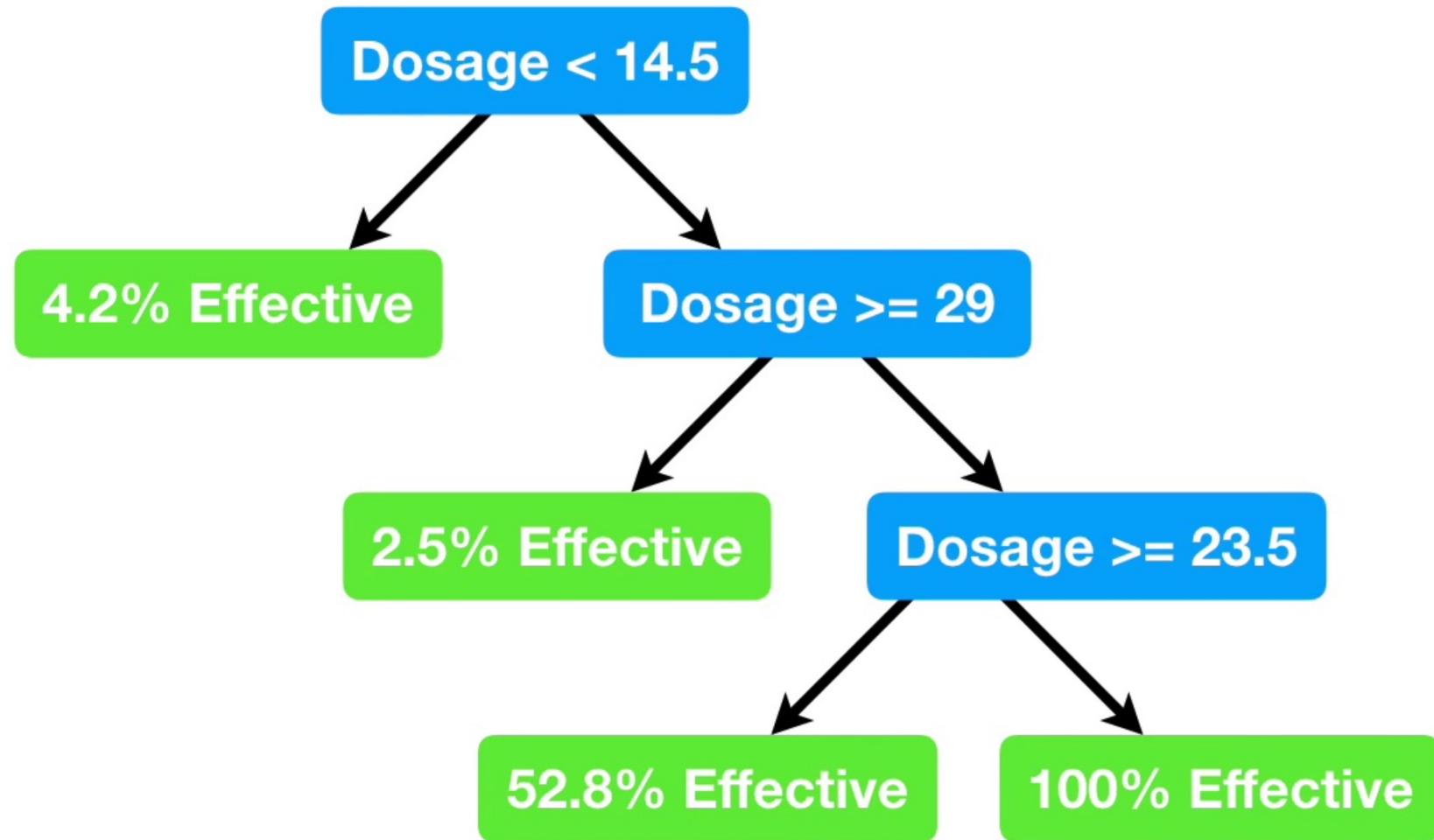
Limits



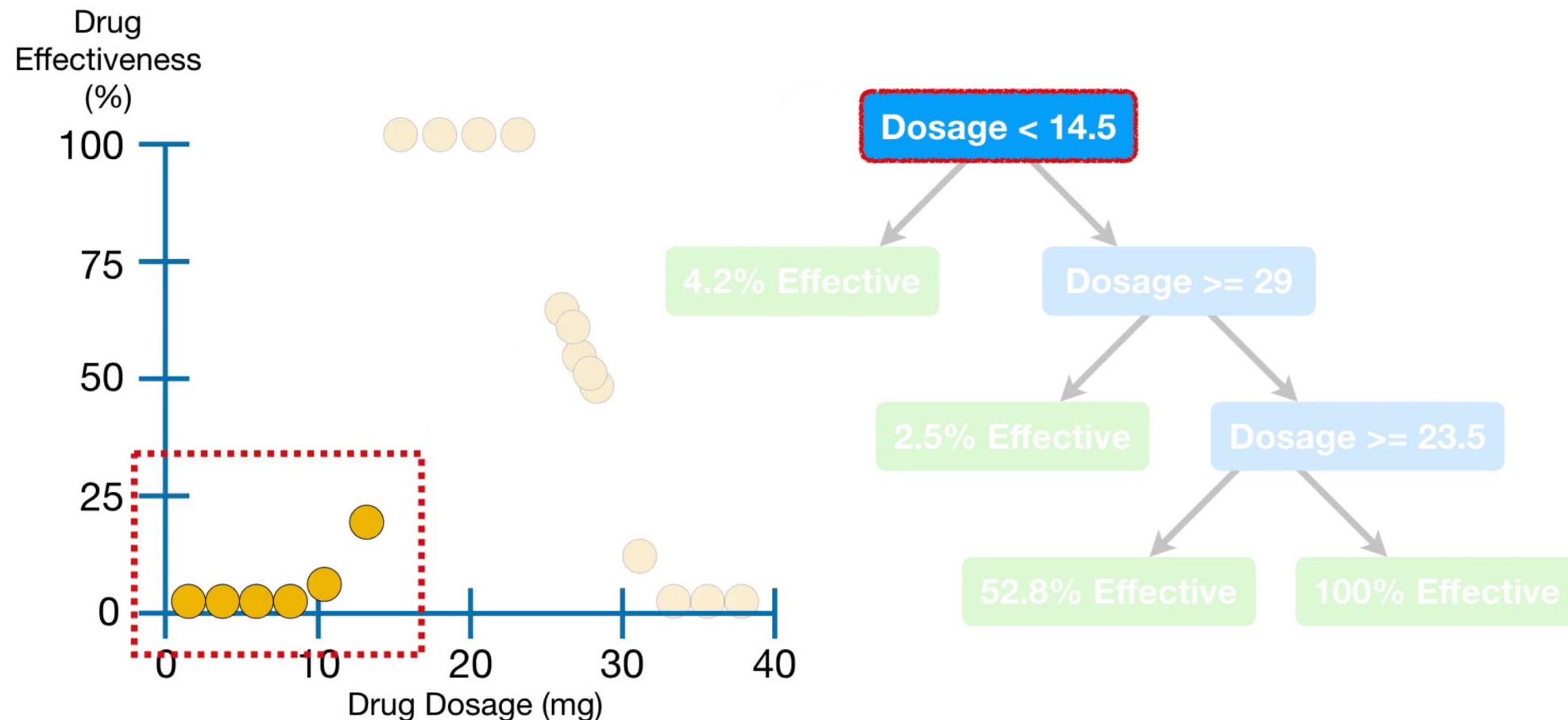
Limits



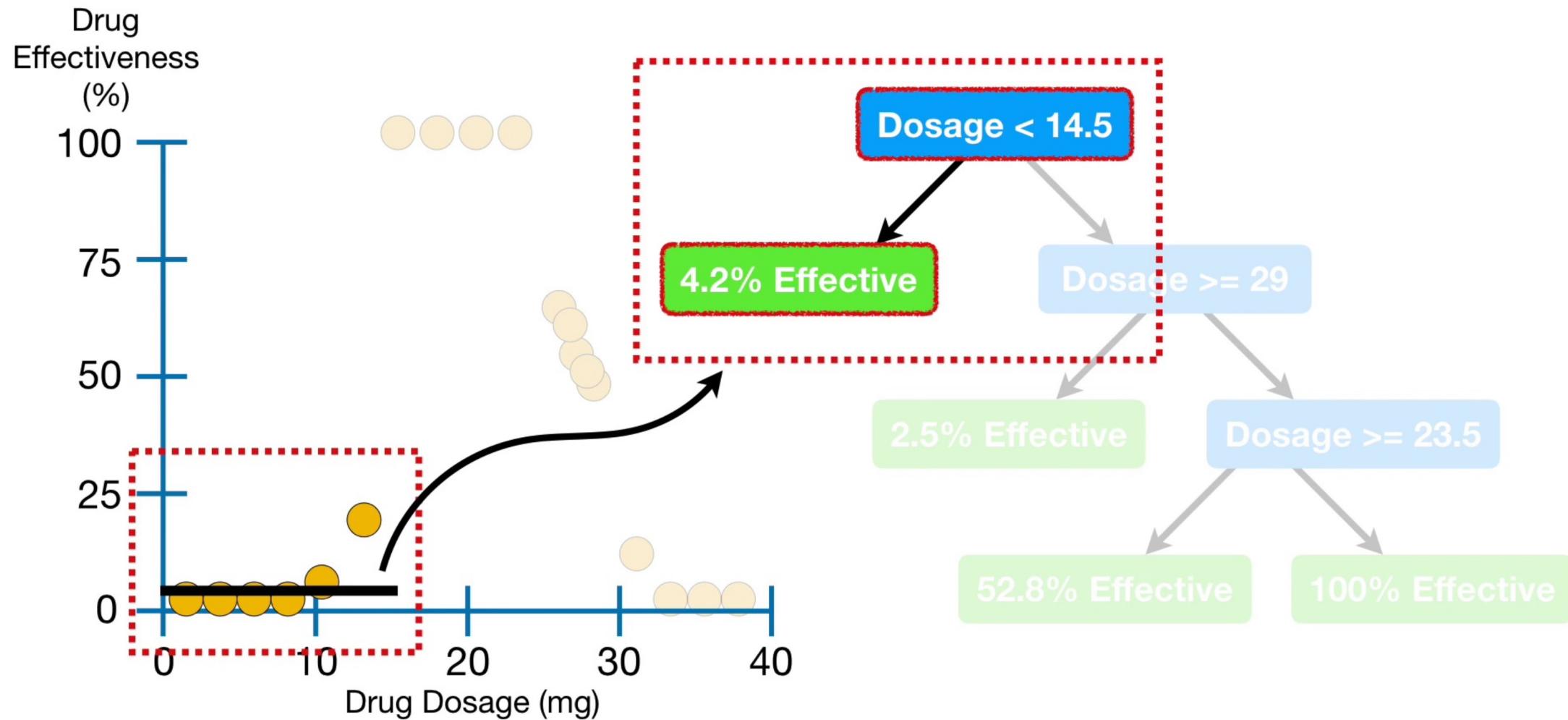
Regression Tree



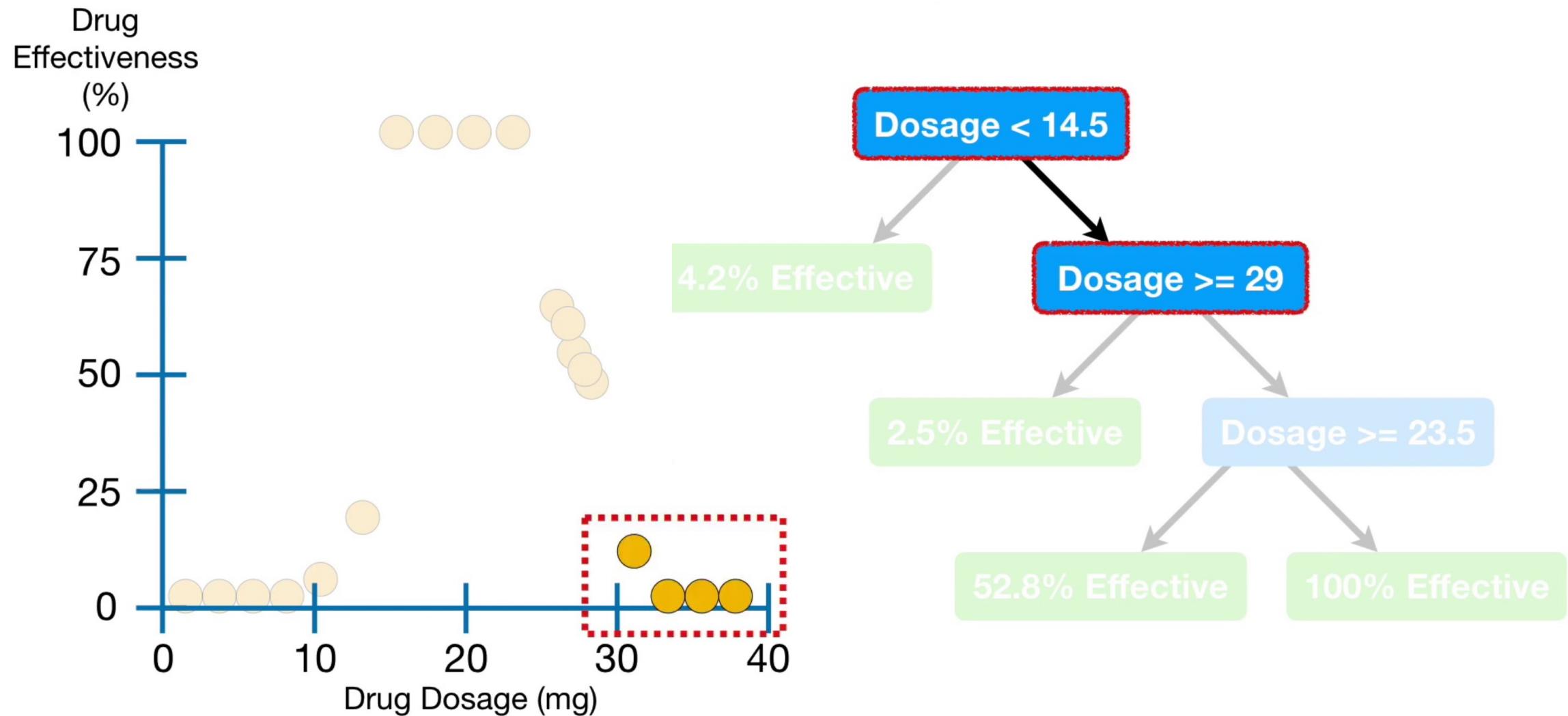
Decision nodes



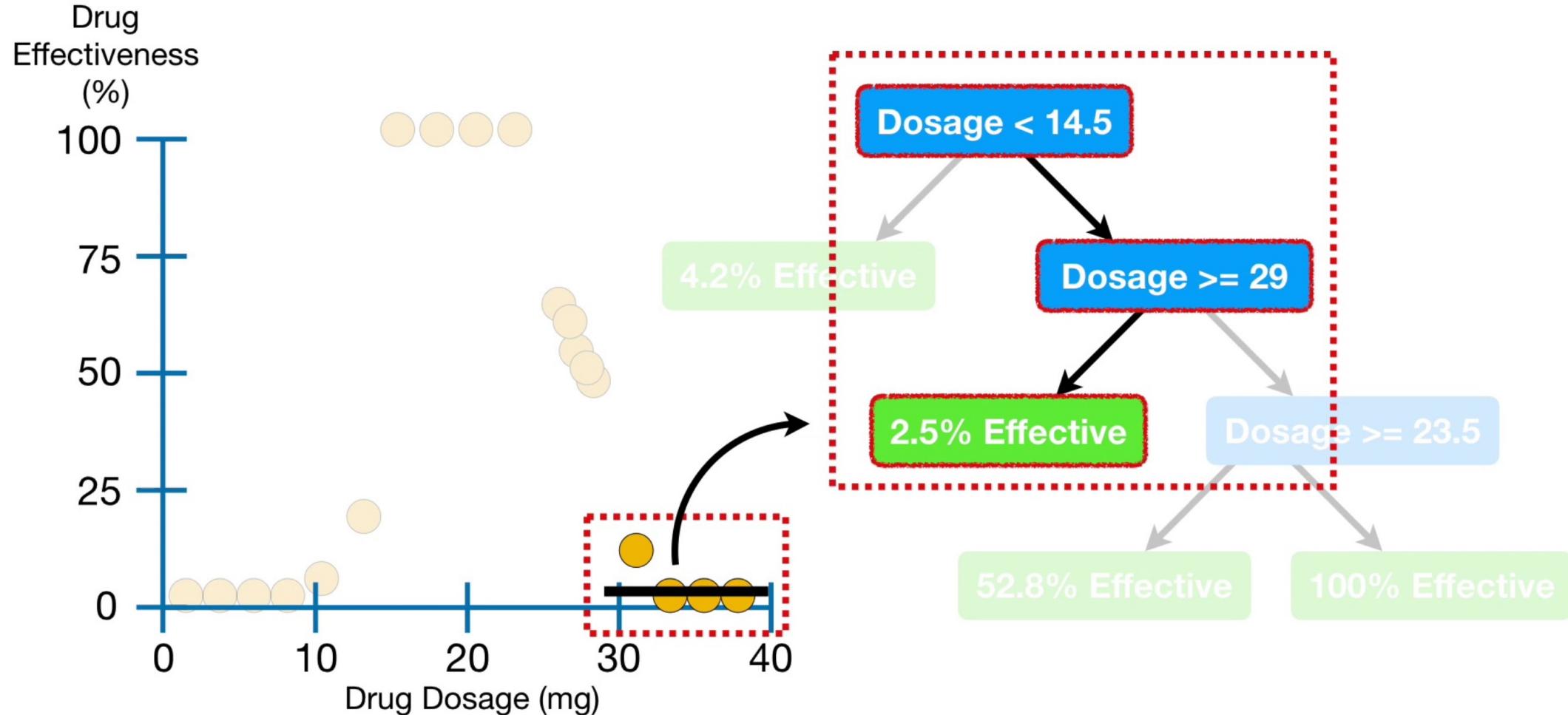
Leaves nodes



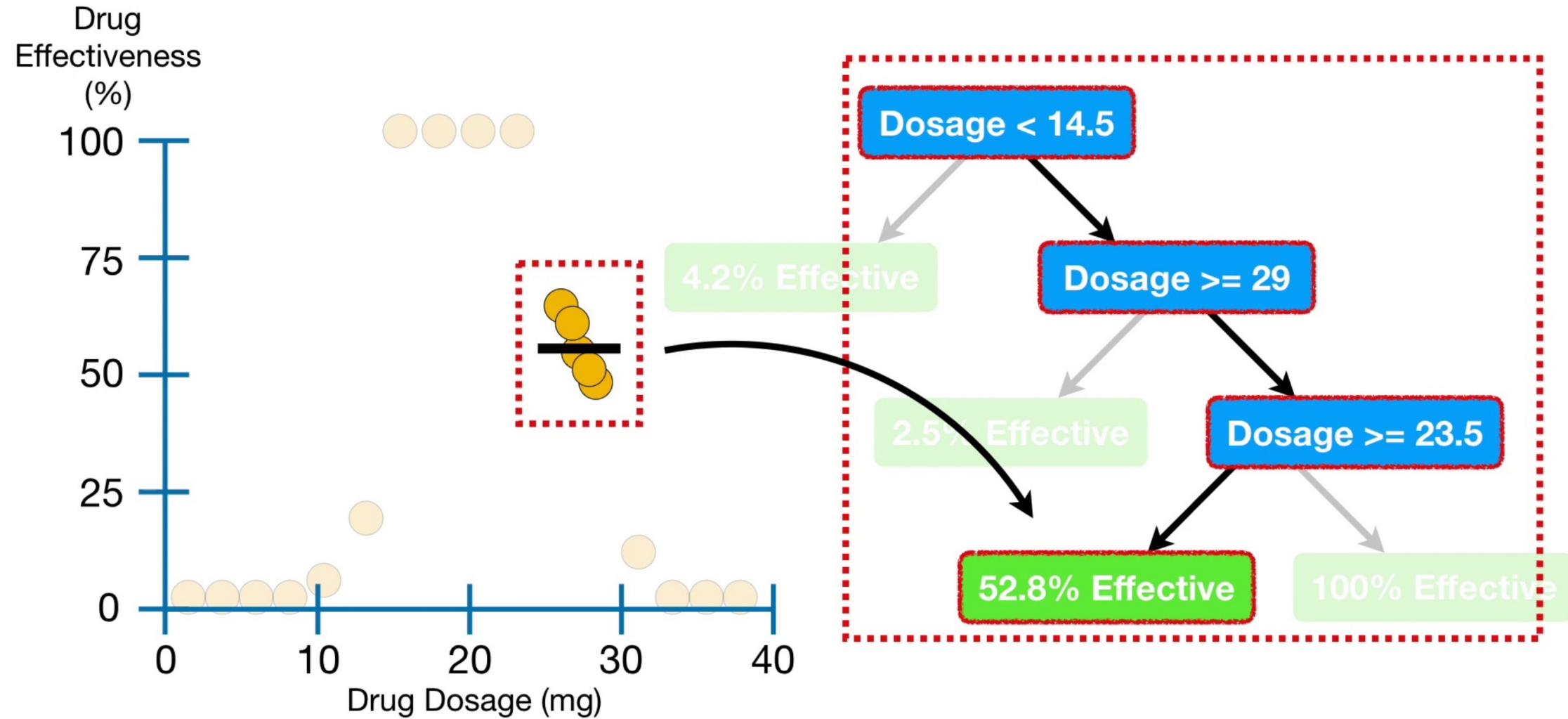
Next nodes



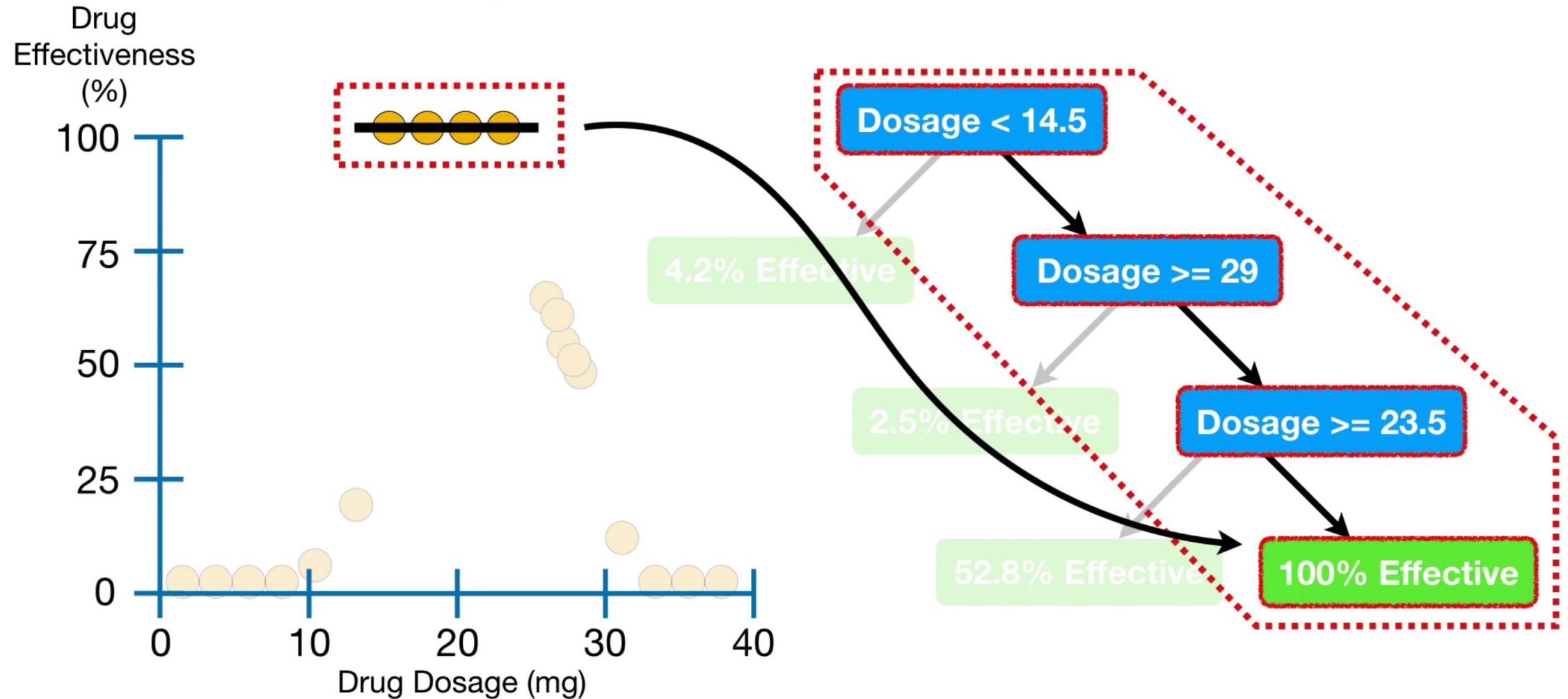
Next Nodes



Next Nodes

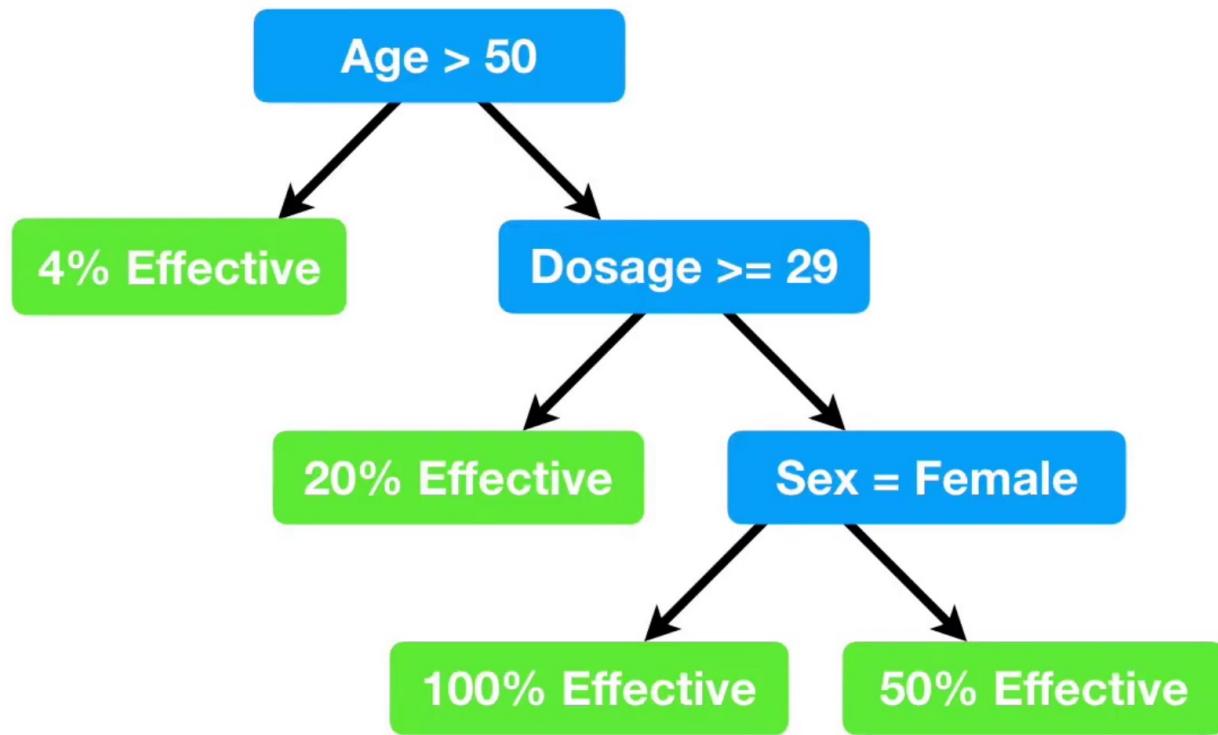


Next Nodes



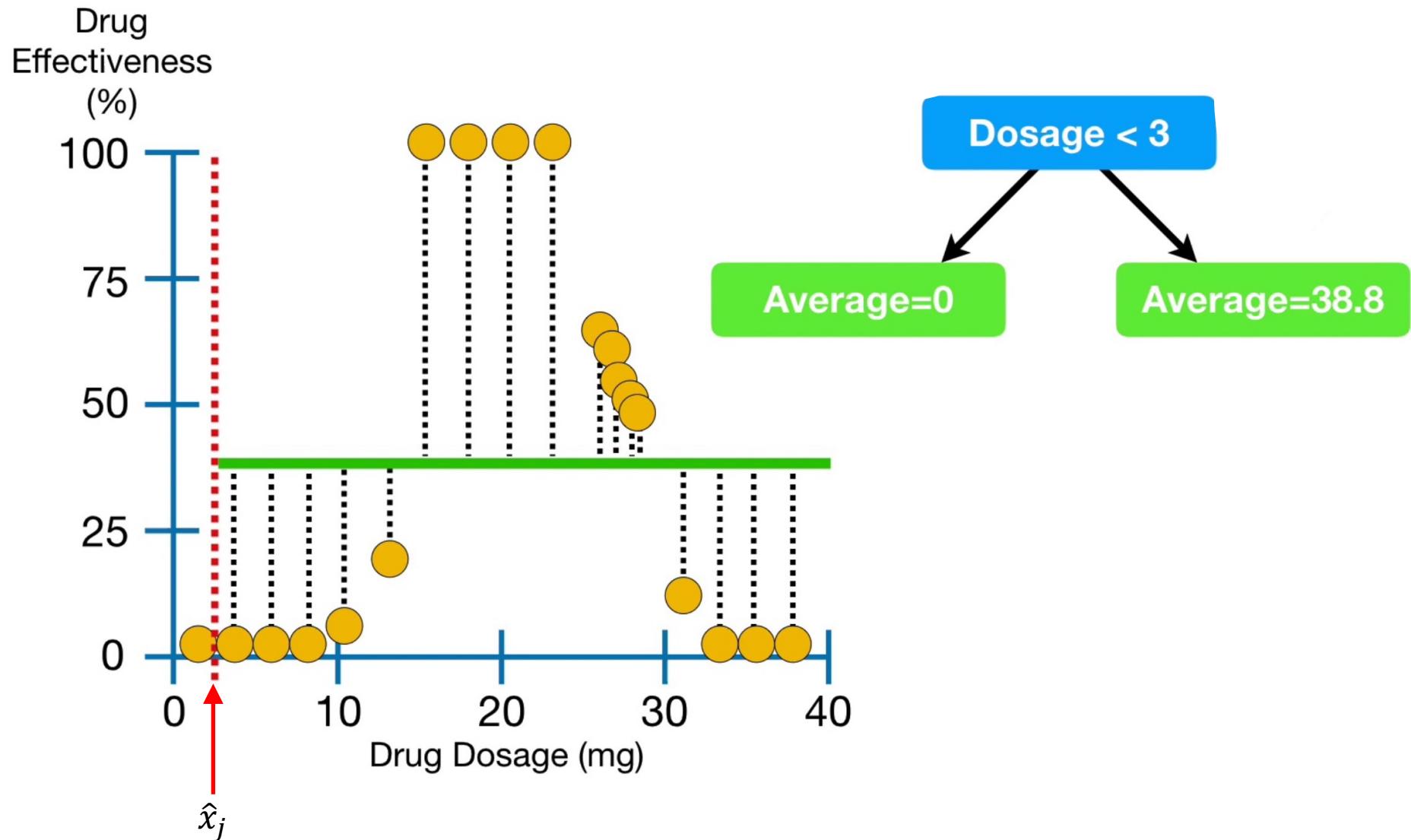
Multiple Features

we select the first feature and so on as a tree



Dosage	Age	Sex	Etc.	Drug Effect.
10	25	Female	...	98
20	73	Male	...	0
35	54	Female	...	100
5	12	Male	...	44
etc...	etc...	etc...	etc...	etc...

Building a Regression Tree



Hypothesis and Residual Sum of Squares (RSS)

Average value

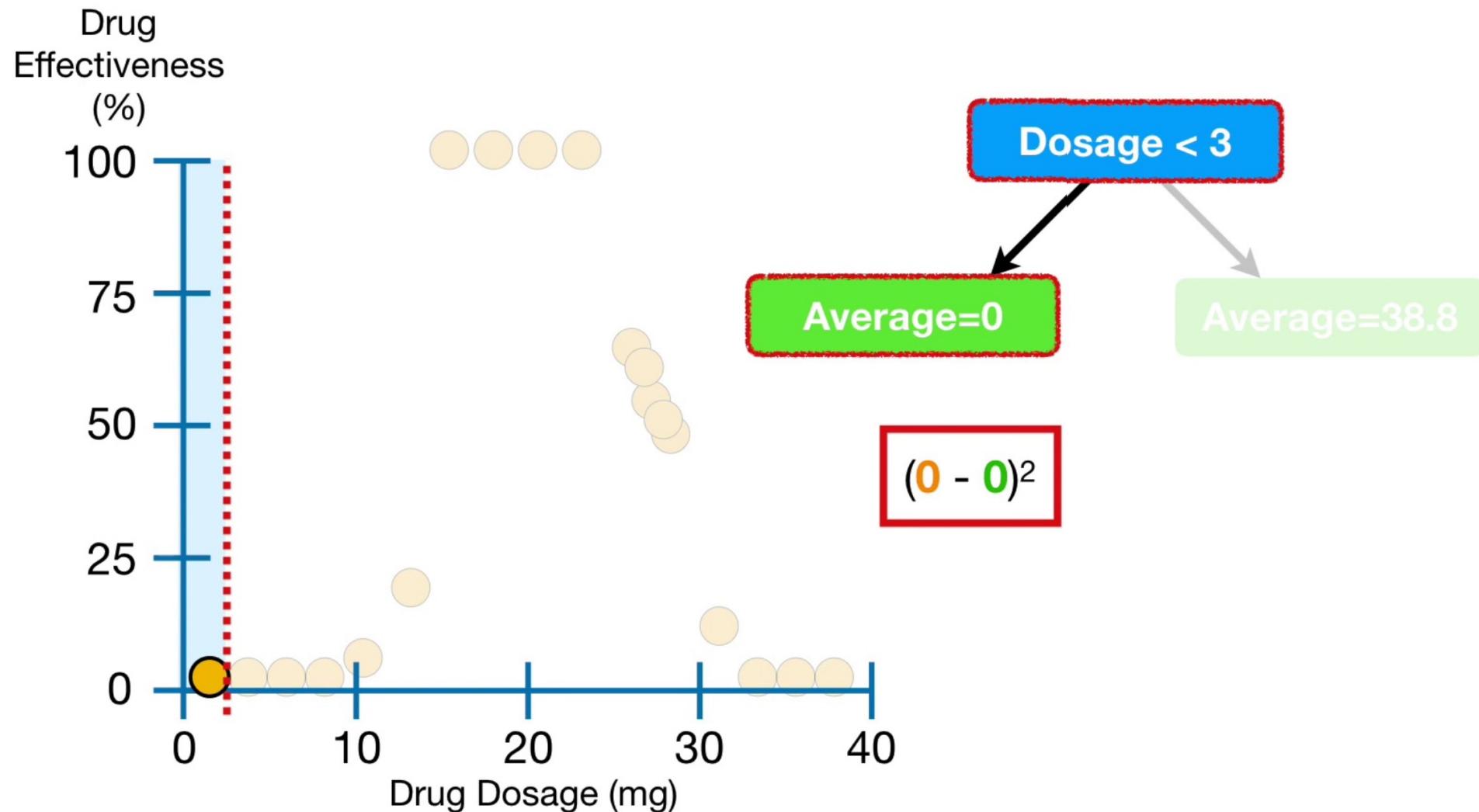
$$h(x^{(i)}) = \sum_{\hat{x}_{j-1} < x^{(i)} < \hat{x}_j} \frac{y^{(i)}}{|\{x^{(i)} : \hat{x}_{j-1} < x^{(i)} < \hat{x}_j\}|}$$

just a way to compute the average. It's just an average

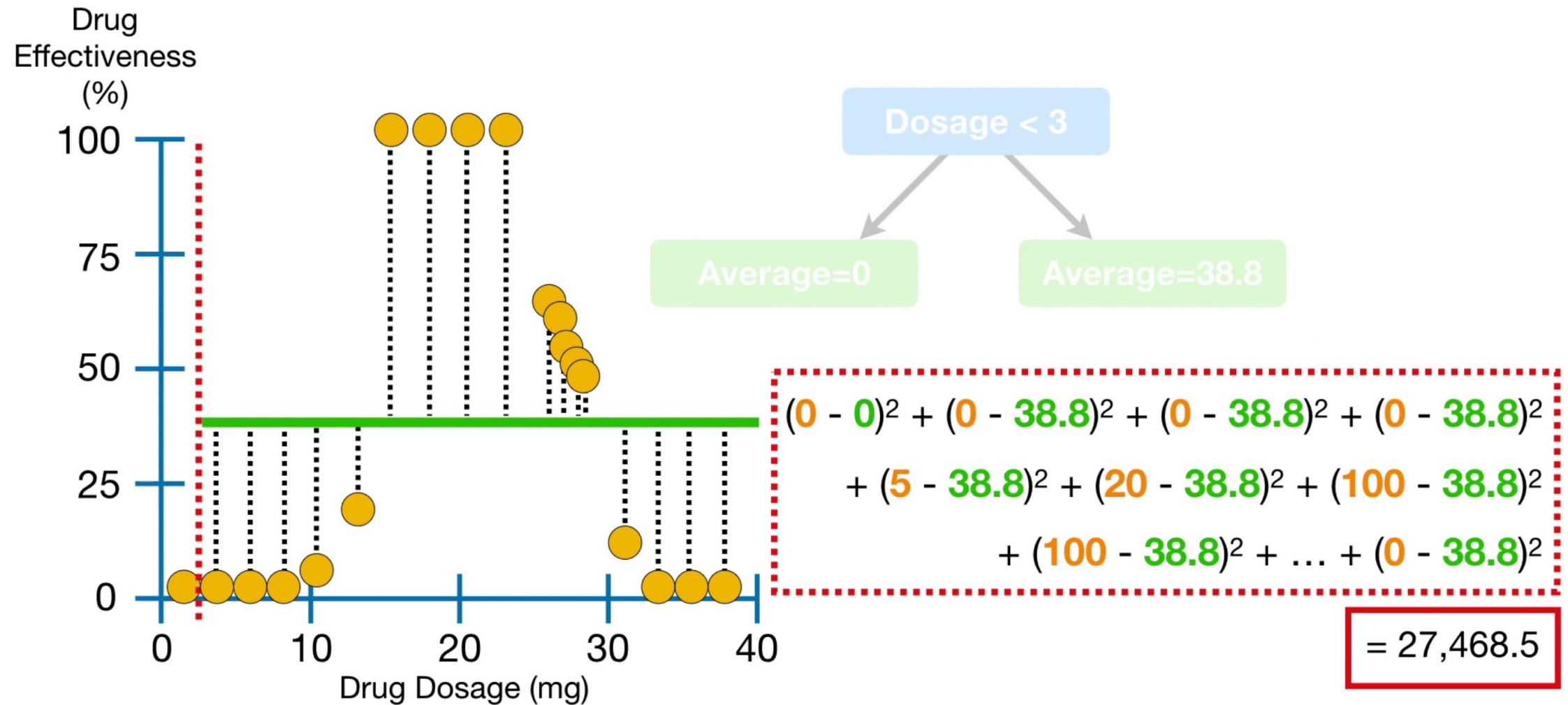
$$RSS = \sum_{i=1}^m (h(x^{(i)}) - y^{(i)})^2$$

Residual Sum of Square. the square sum of the error

RSS

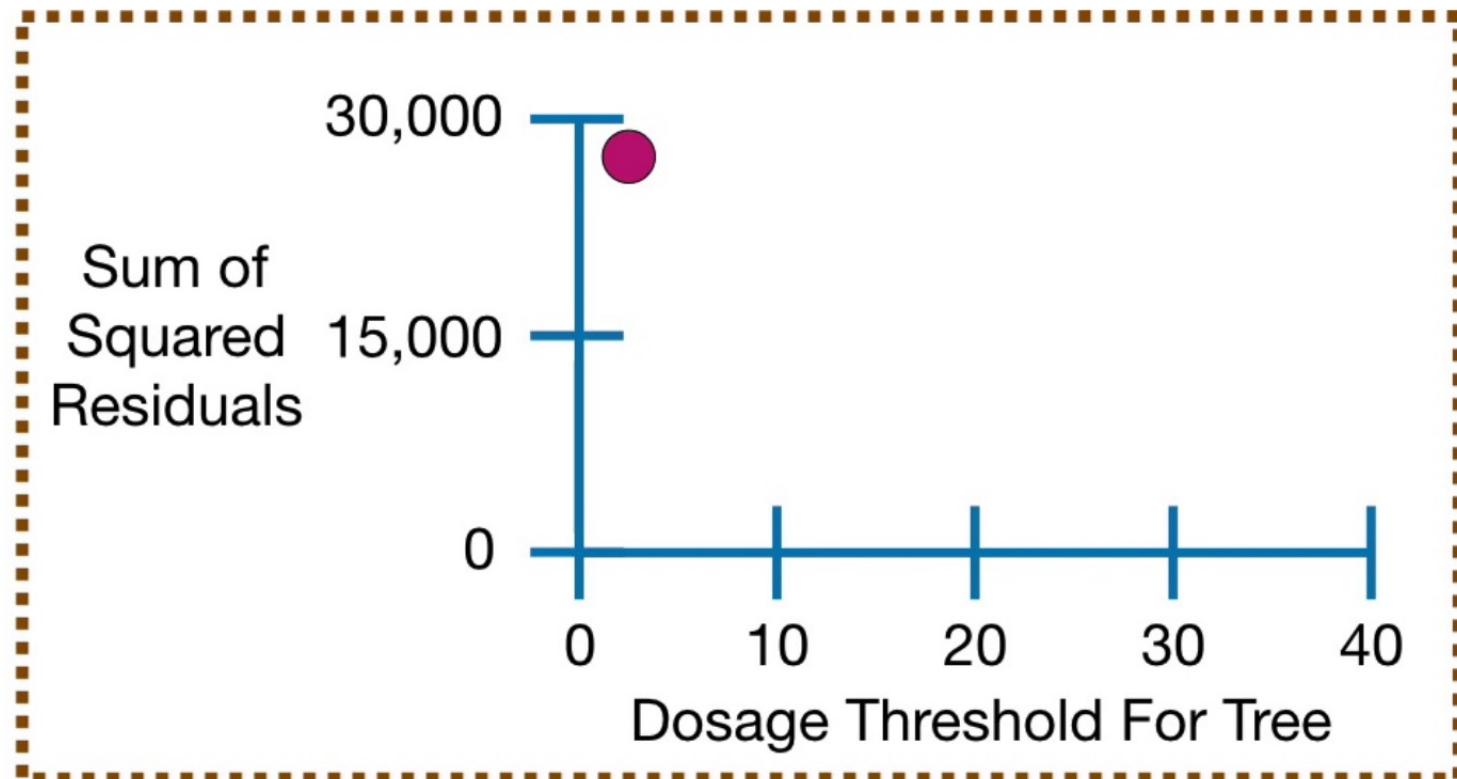


RSS



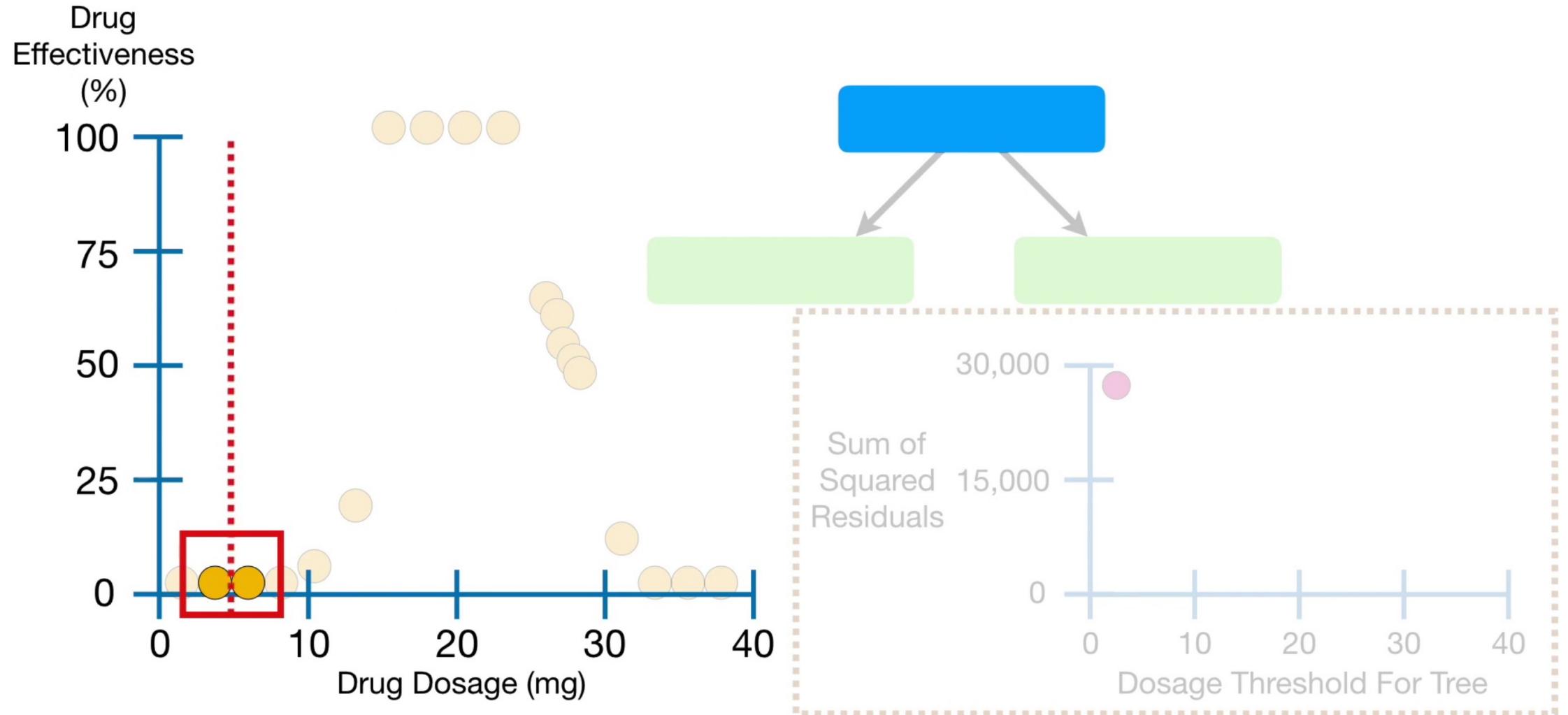
RSS plot

in this case the dosage threshold is 3

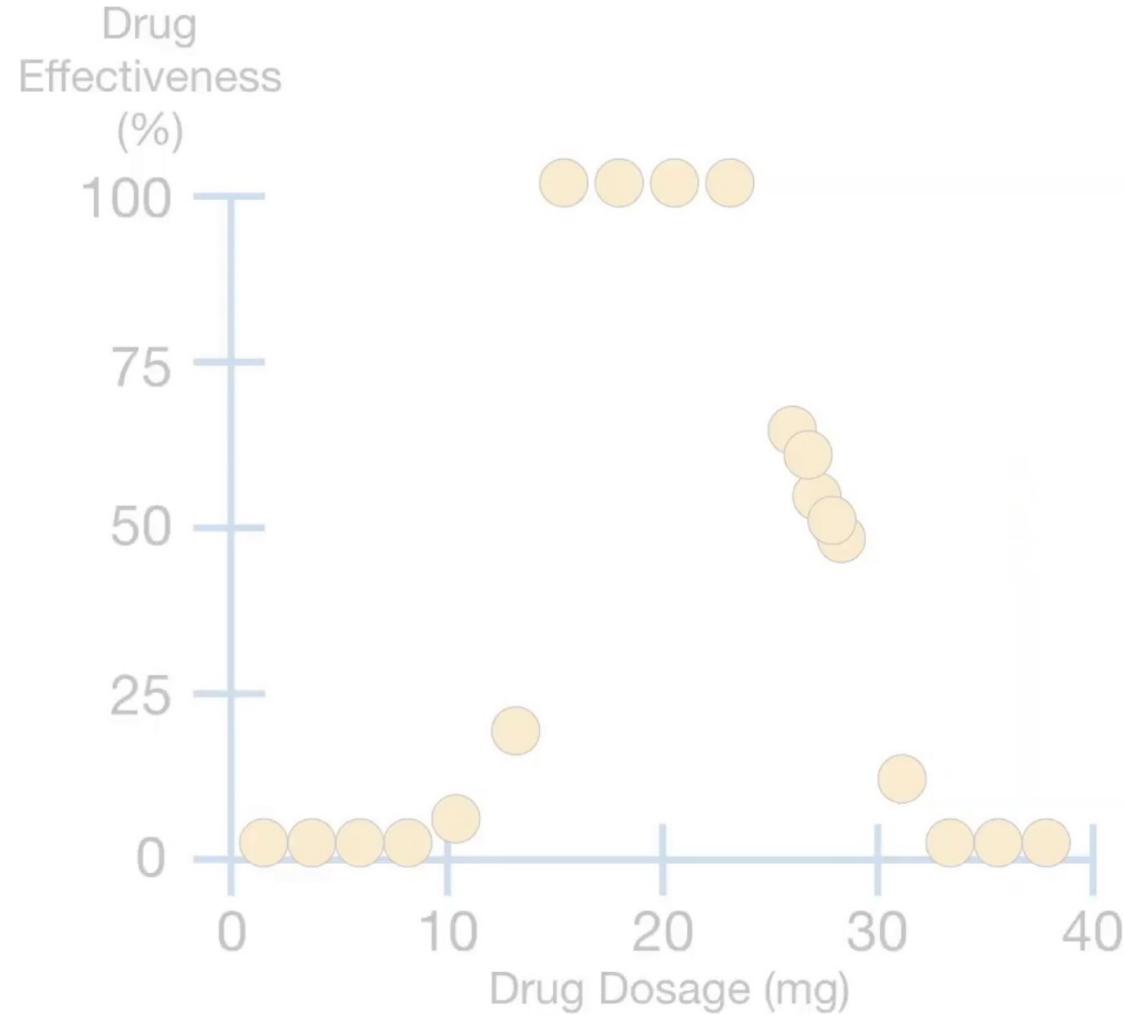


Building a Regression Tree

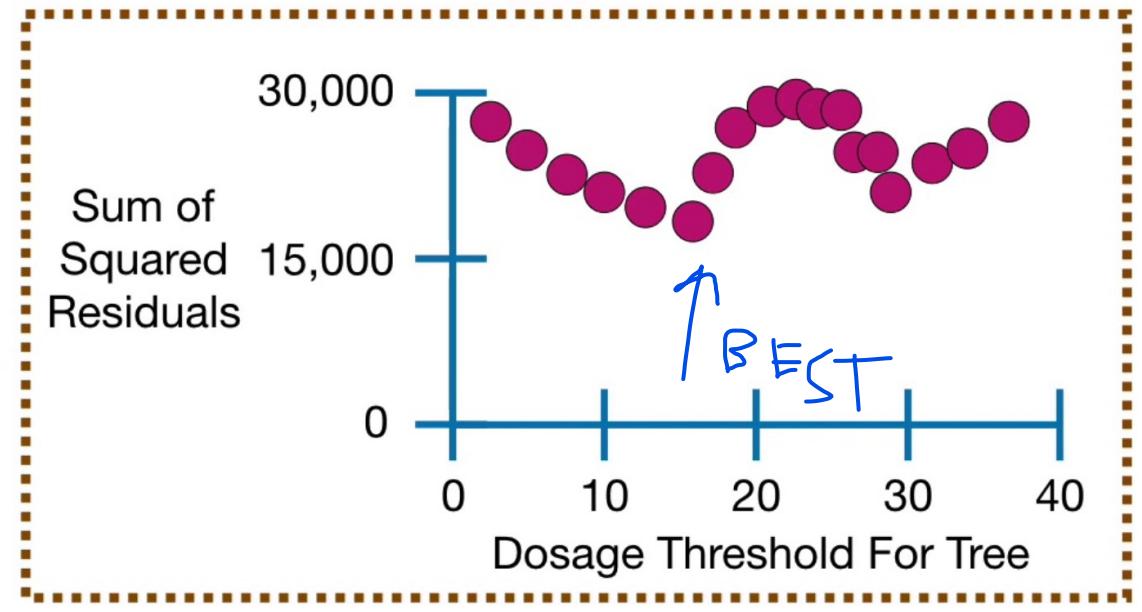
now we move the threshold



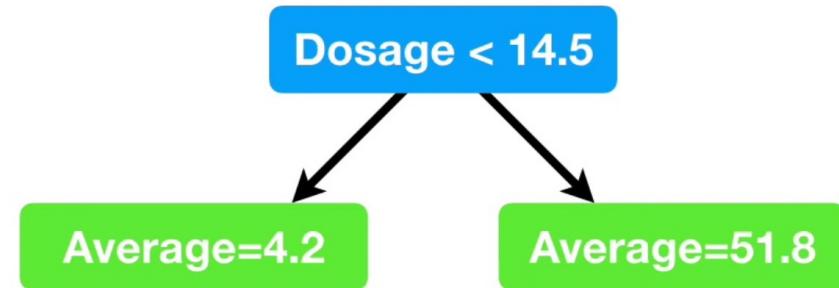
Building a Regression Tree



at the end we have this, we have that the best threshold of this feature is circa 15 .



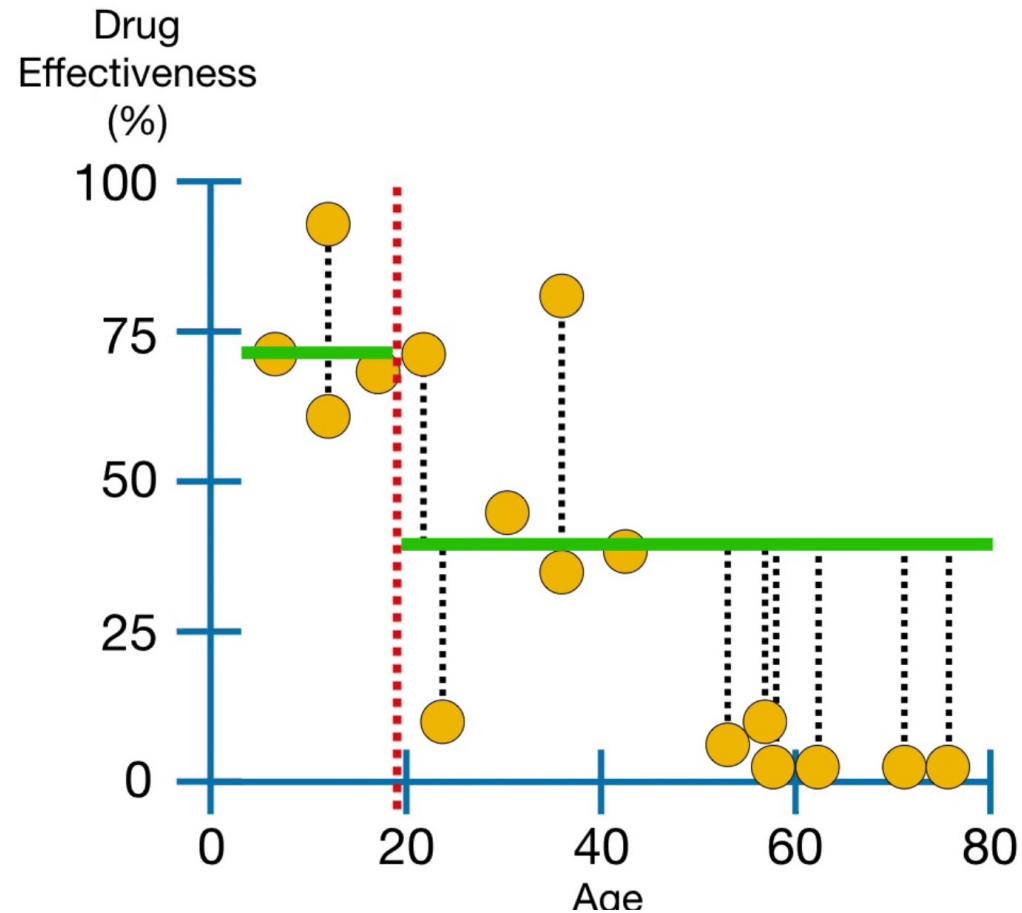
Multiple Features



if i have multiple feature we do the same

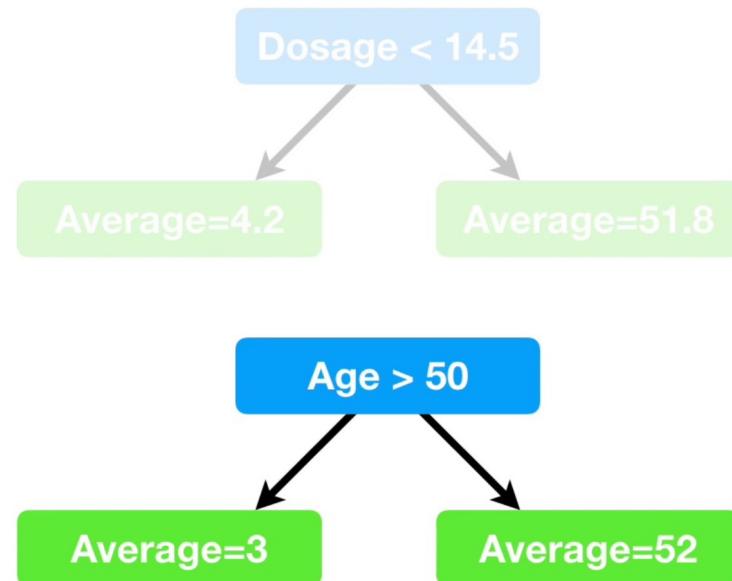
Dosage	Age	Sex	Drug Effect.
10	25	Female	98
20	73	Male	0
35	54	Female	6
5	12	Male	44
etc...	etc...	etc...	etc...

Multiple Features



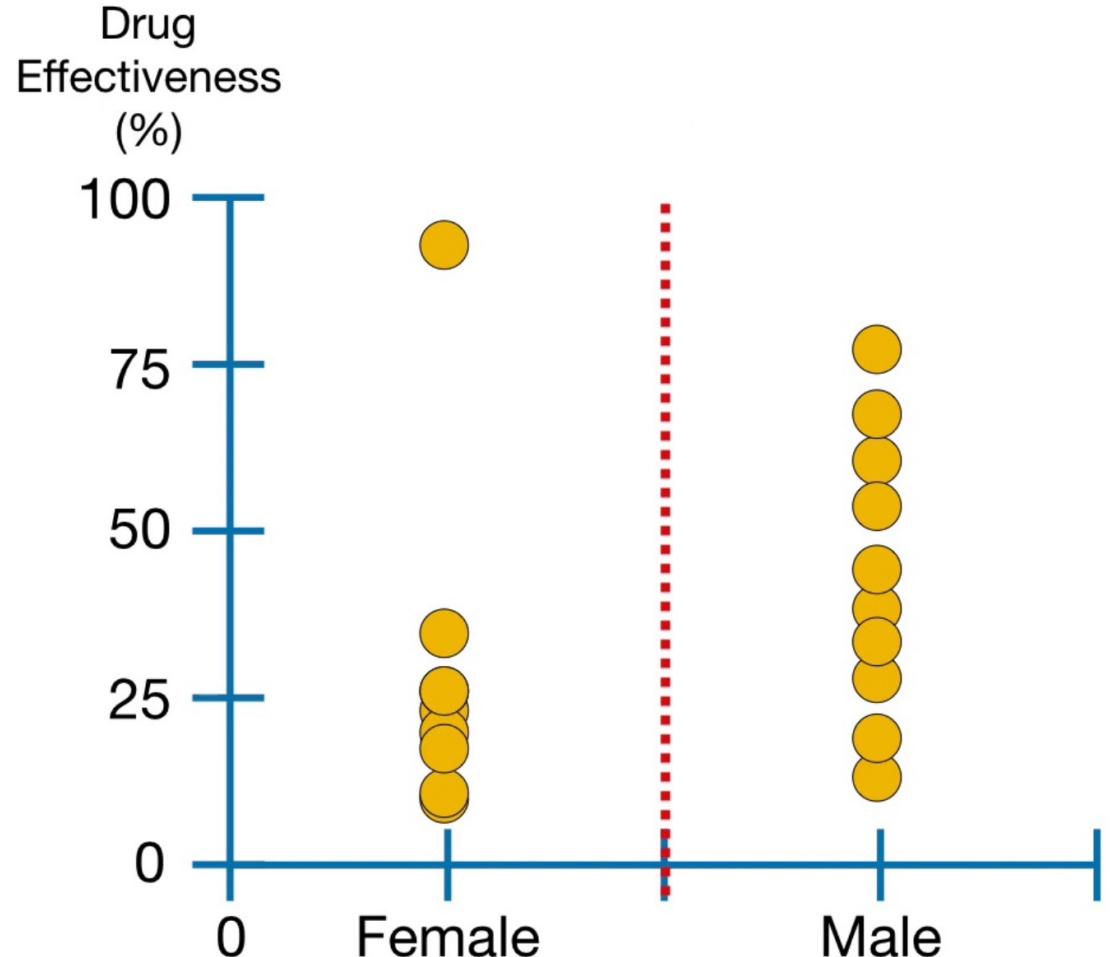
Dosage	Age	Sex	Drug Effect.
10	25	Female	98
20	73	Male	0
35	54	Female	6
5	12	Male	44
etc...	etc...	etc...	etc...

Multiple Features



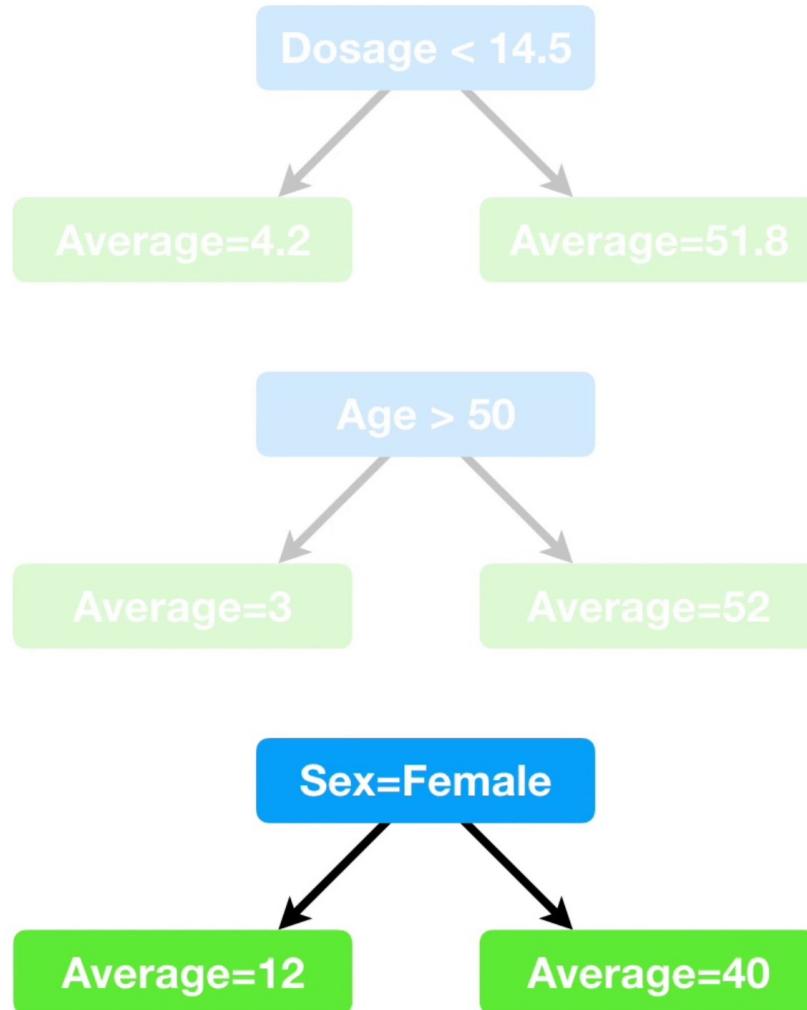
Dosage	Age	Sex	Drug Effect.
10	25	Female	98
20	73	Male	0
35	54	Female	6
5	12	Male	44
etc...	etc...	etc...	etc...

Multiple Features



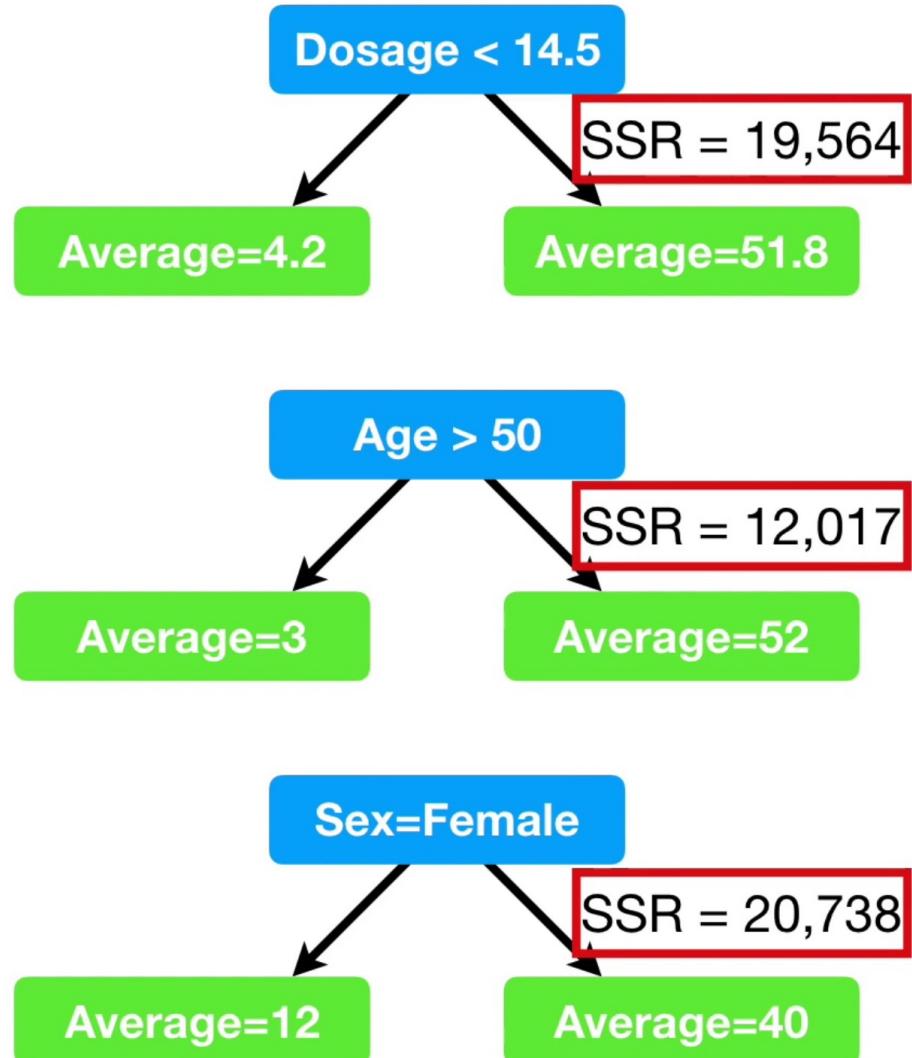
Dosage	Age	Sex	Drug Effect.
10	25	Female	98
20	73	Male	0
35	54	Female	6
5	12	Male	44
etc...	etc...	etc...	etc...

Multiple Features



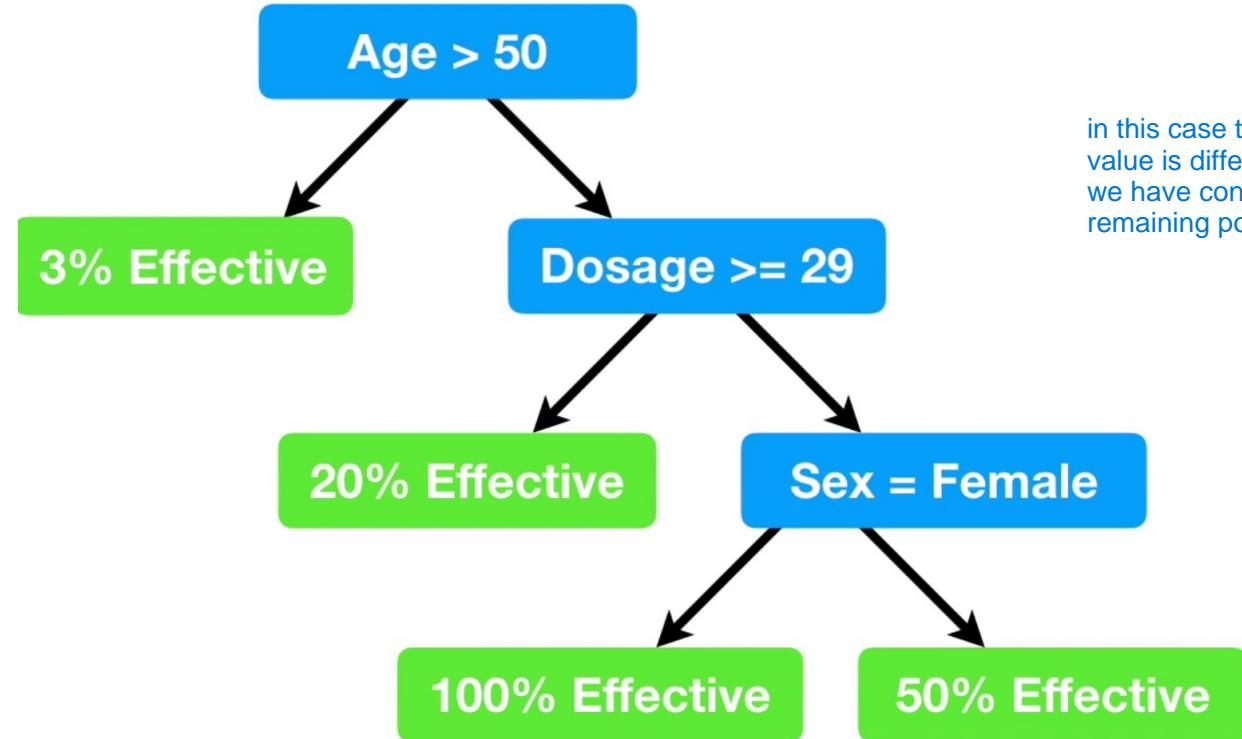
Dosage	Age	Sex	Drug Effect.
10	25	Female	98
20	73	Male	0
35	54	Female	6
5	12	Male	44
etc...	etc...	etc...	etc...

Multiple Features



chose the one that has the lowest SSR value. In this case the best variable to select first is AGE

Multiple Features



after the age, we calculate the SSR on the remaining point, so the age less of 50%. We compare the SSR of dosage and sex and we choose the smallest SSR and so on

in this case the Dosage value is different because we have considered the remaining point

Dosage	Age	Sex	Drug Effect.
10	25	Female	98
20	73	Male	0
35	54	Female	6
5	12	Male	44
etc...	etc...	etc...	etc...