R软件：以逻辑回归为例介绍制作列线图的过程

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R软件：以逻辑回归为例介绍制作列线图的过程。列线图(nomogram)
是一个能够将逻辑结果以图形的方式展示出来的工具。本文将讨论一下用R软件如何制作逻辑回归的列线图。

制作步骤：

1、安装rms程序包。首先你需要选择安装镜像，最近我们发现China(Xiamen)这个镜像速度还比较快。安装代码为：install.packages("rms")

2、调用rms过程。代码为require(rms)

3、生成回归所需数据，本文采用R的示例数据。

代码如下：

```
n <- 1000

set.seed(17)

age <- rnorm(n, 50, 10)

blood.pressure <- rnorm(n, 120, 15)

cholesterol <- rnorm(n, 200, 25)

sex <- factor(sample(c('female','male'), n,TRUE))

# Specify population model for log odds that Y=1

L <- .4*(sex=='male') + .045*(age-50) + (log(cholesterol -10)-5.2)*(-2*(sex=='female') + 2*(sex=='male'))

# Simulate binary y to have Prob(y=1) = 1/[1+exp(-L)]

y <- ifelse(runif(n) < plogis(L), 1, 0)
```

4、制作列线图。代码如下：

```
ddist <- datadist(age,blood.pressure, cholesterol, sex)

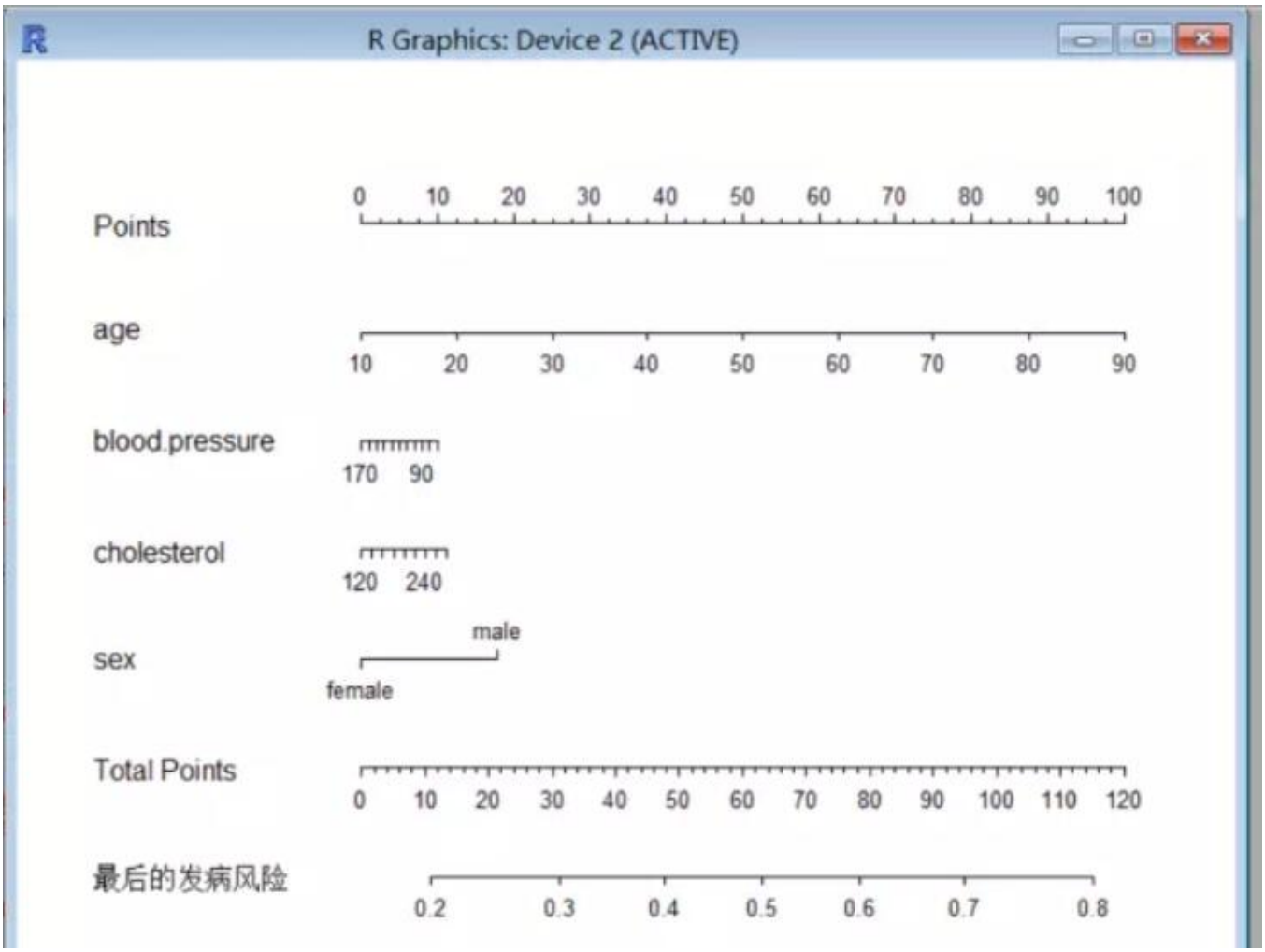
options(datadist='ddist')

f <- lrm(y ~ age+ blood.pressure+ cholesterol + sex)

nom <- nomogram(f, fun=plogis, fun.at=c(.001,.01, .05, seq(.1,.9, by=.1), .95, .99, .999),lp=F,
funlabel="最后的发病风险")

plot(nom)
```

5、结果如下。



在经过了上述的过程之后，我们就可以做出列线图了。但是如果我们要写作一篇关于列线图的文章该如何进行呢?我们可以看看别人是怎么做的，这个例子是乳腺癌术前化疗对病理完全缓解(PCR)和无转移生存(MFS)的影响，详见参考文献。作者写作内容有：(1)将样本按照不同来源(来自不同的机构)分成了训练样本和验证样本，(2)用训练样本去建立回归模型，(3)用验证样本并判断模型的优劣，(4)制作列线图，(5)同时作者还制作了5年和10年disease-free的列线图。

文章中涉及的图形如下：

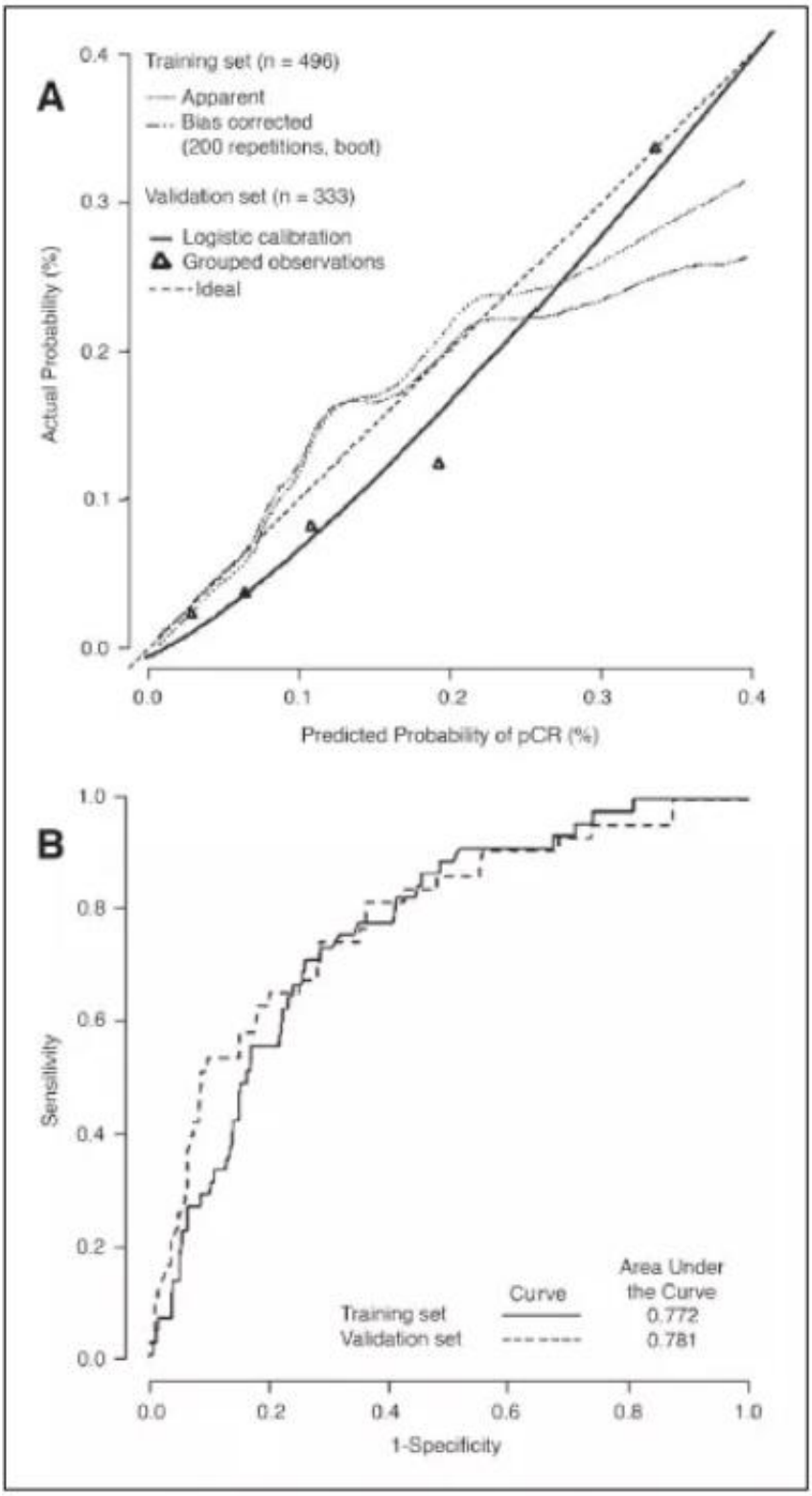


Fig 1. (A) Predictive accuracy of the model (nomogram) to predict pathologic complete response to three or four courses of anthracycline preoperative therapy. Predicted and observed pathologic complete response (pCR) rates are plotted as grouped observation and logistic calibration for the training set. (B) The receiver operating characteristic curves of the prediction model in the training and validation sets.

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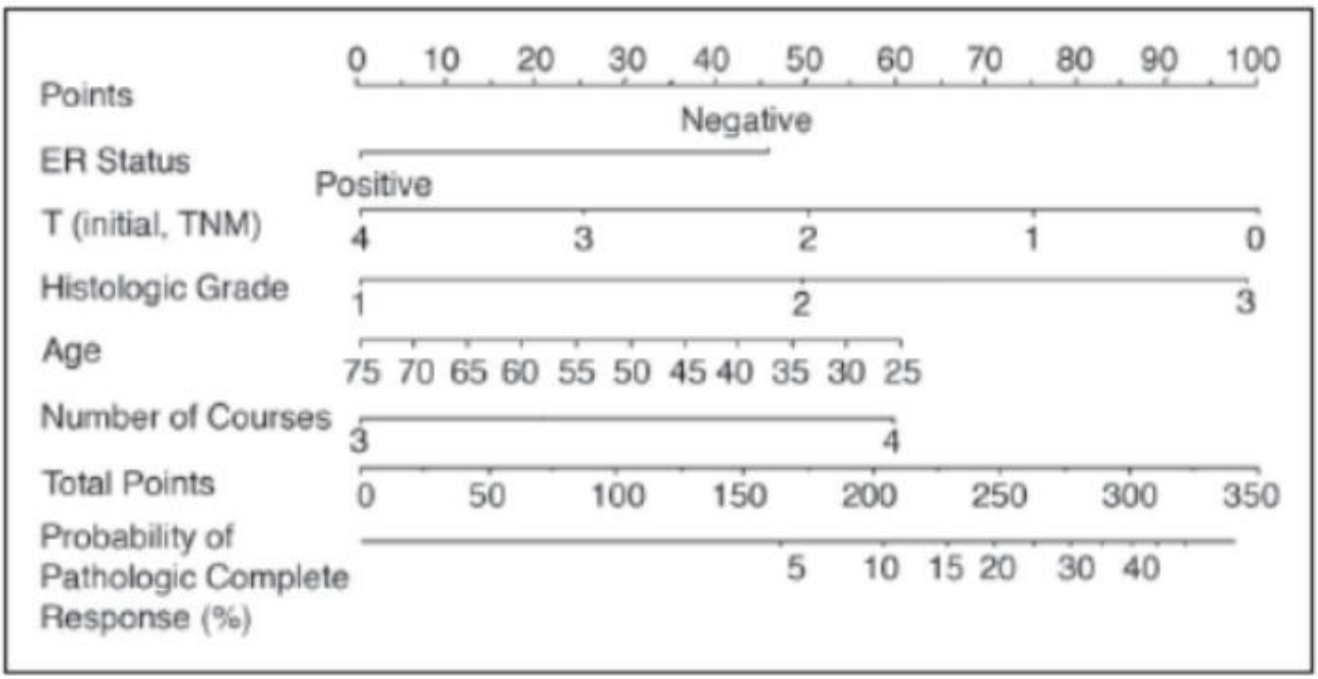


Fig 2. Nomogram to estimate the probability of pathologic complete response (pCR) to anthracycline preoperative chemotherapy. Find the predictor points on the uppermost point scale that correspond to each patient variable and add them up. The total points projected to the bottom scale indicate the % probability of pCR. For example, a 65-year-old patient with a T3, estrogen receptor (ER)–negative, grade 2 tumor treated with four courses of preoperative fluorouracil, doxorubicin, and cyclophosphamide has a score of 13 + 25 + 0 + 50 + 60 = 148, corresponding to less than 5% chance of pCR.

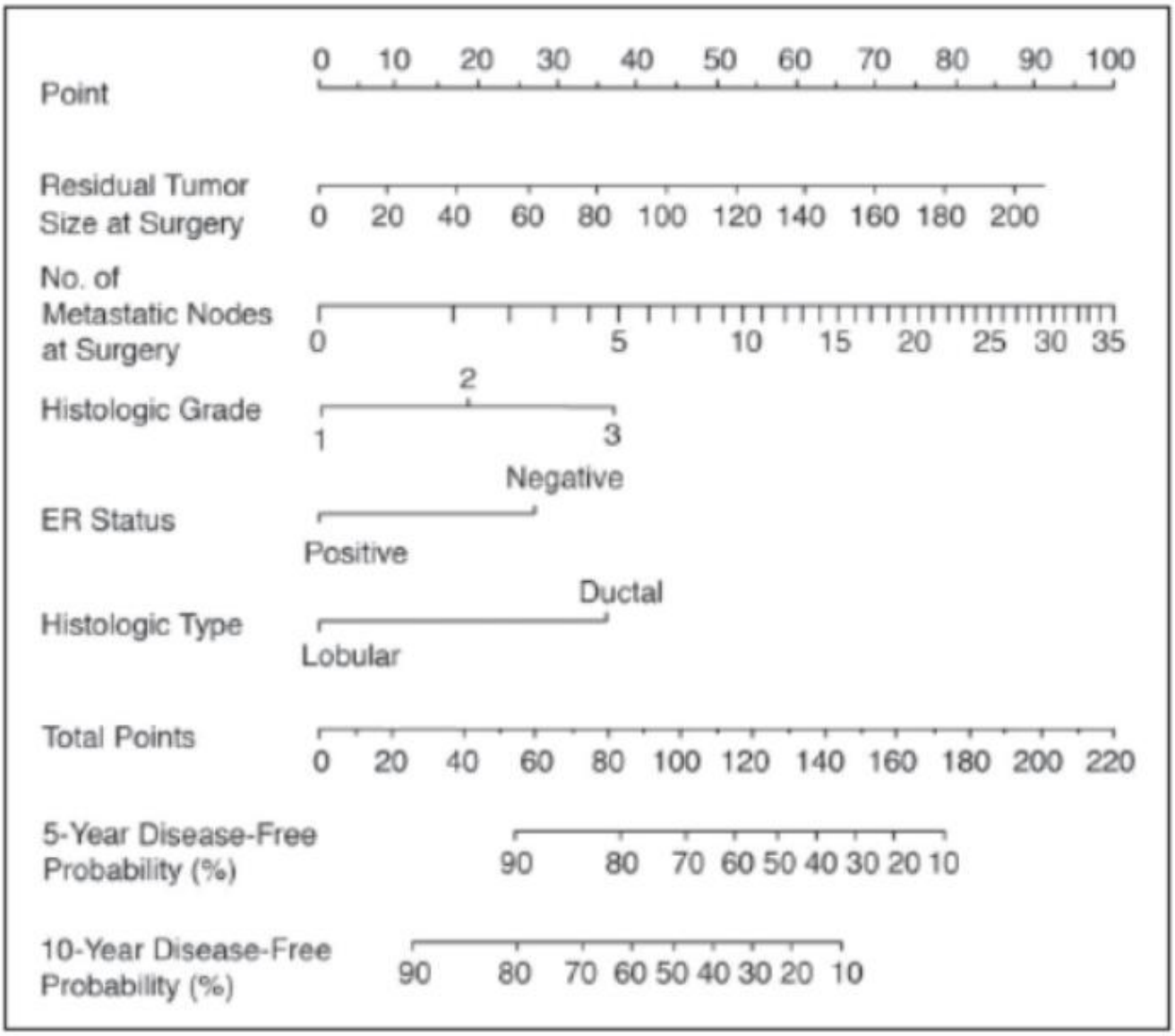


Fig 5. Nomogram to predict for 5-year and 10-year probabilities of freedom from distant metastasis for patient with residual cancer either in the breast or in the axilla. ER, estrogen receptor.

参考文献：

Rouzier R, Pusztai L, Delaloge S, Gonzalez-Angulo AM, Andre F, Hess KR, et al. Nomograms to predict pathologic complete response and metastasis-free survival after preoperative chemotherapy for breast cancer. J Clin Oncol. 2005 2005-11-20;23(33):8331-9.

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