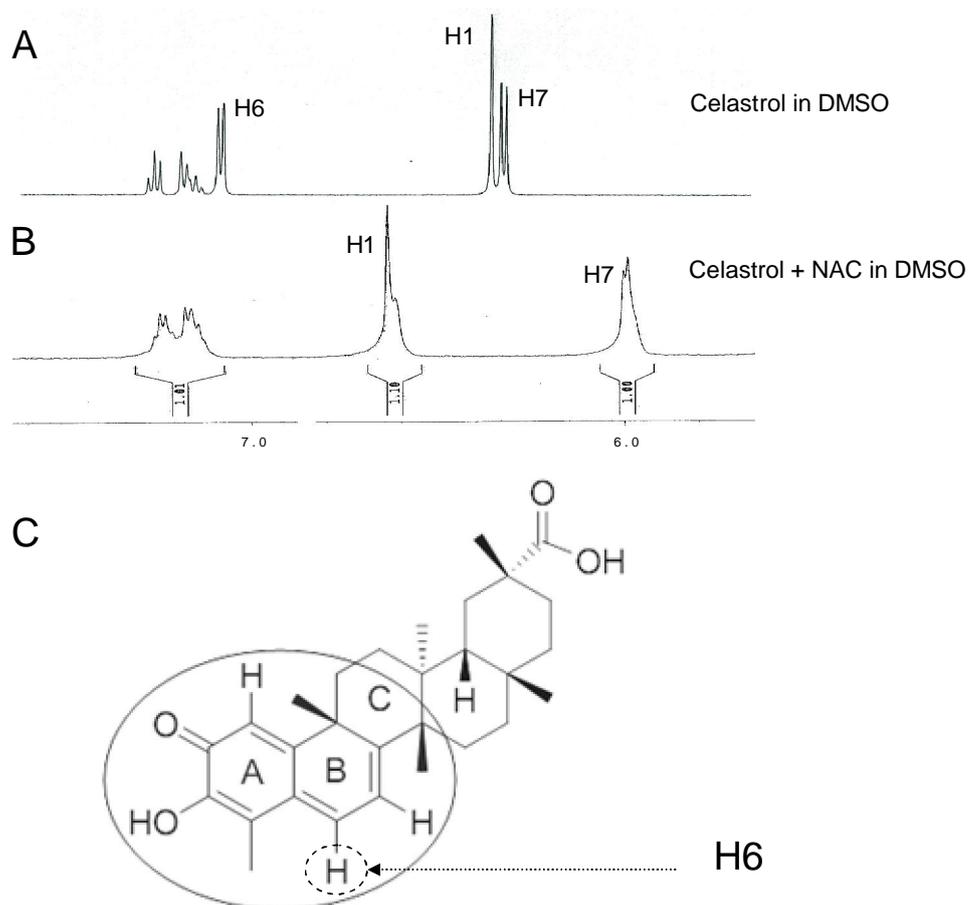


### Additional file 3

#### $^1\text{H}$ NMR spectrum analysis the reactive site on celastrol

To find out the location of celastrol's addition reaction, we mixed celastrol with NAC at a ratio of 1:2 in DMSO- $d_6$  and then recorded 1D  $^1\text{H}$  NMR spectrum. The spectrum shows the Michael adduct at C6 in ring B of celastrol (Figure S3) as previously reported by Sreeramulu S [21].



**Figure S3.** Detection of celastrol's addition reaction site. **A:** the signal detected H1, H6 and H7 on ring A and B in celastrol. **B:** disappearance of H6 on ring B of celastrol when reacted with NAC. **C:** structure of celastrol and H6 in ring B.