

### **Description of Additional Supplementary Files**

File Name: Supplementary Data 1

Description: Significantly enriched biological processes at baseline (normoxia).

File Name: Supplementary Data 2

Description: Proteins significantly upregulated in response to hypoxia in breast cancer cell lines.

File Name: Supplementary Data 3

Description: Top 5 upstream transcriptional regulators of the hypoxia-upregulated proteins.

File Name: Supplementary Data 4

Description: Hypoxia-upregulated biological processes in main network (125 of 150 hypoxia-upregulated proteins).

File Name: Supplementary Data 5

Description: Hypoxia-upregulated biological processes, luminal-like secretome.

File Name: Supplementary Data 6

Description: Hypoxia-upregulated biological processes, basal-like secretome.

File Name: Supplementary Data 7

Description: Drug signatures negatively correlated to high 33P.

File Name: Supplementary Data 8

Description: Multivariate survival analysis (proportional hazards regression model) including 13P hypoxia validation signature in breast cancer patients (METABRIC-Discovery cohort, n=832).