



# Correlation of high body mass index and circulating tumor cell positivity in patients with early-stage breast cancer

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## Background

The prognostic relevance of both body mass index (BMI) and circulating tumor cells (CTC) has been confirmed in different trials for patients with early breast cancer (Calle, E. et al 2003; Cristofanilli, M. et al. 2006; Hayes, D. et al. 2010). This analysis evaluates the correlation between high BMI and CTC positivity as risk factors for reduced disease free and overall survival.

## Methods

Data of 3658 patients of the SUCCESS A trial have been analyzed. CTC count and BMI were documented before (N = 2026) and after (N = 1504) chemotherapy. Within this trial patients with early breast cancer were randomized to two chemotherapy regimens and received either 3 cycles of fluorouracil, epirubicin and cyclophosphamide followed by 3 cycles of docetaxel (FE100C-Doc) or 3 cycles of fluorouracil, epirubicin and cyclophosphamide followed by 3 cycles of docetaxel and gemcitabine (FE100C-DG). In addition, patients were randomized to zoledronic acid either for 2 or 5 years. CTC were analyzed using the CellSearch® System (Veridex, USA). Different groups of bodyweight were classified according to the WHO's international definition: Underweight (BMI < 18.5 kg/m<sup>2</sup>), normal range (BMI > 18.5- < 25 kg/m<sup>2</sup>), overweight (BMI >25- < 30 kg/m<sup>2</sup>), obesity (BMI > 30 kg/m<sup>2</sup>). Correlation between CTC count and BMI was analyzed using frequency-table methods.

## Results

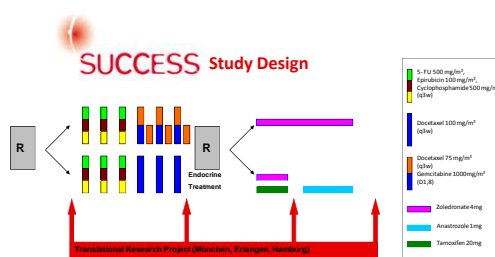


Figure 1: Clinical Trial Design

At study entry 24 (1.2%) patients were underweight (UW), 952 (47%) patients were normal weight (NW), 658 (32.5%) patients were overweight (OW) and 392 (19.4%) patients were obese (OB). Before the start of chemotherapy, CTC were detected in 435 (21.5%) patients. We did not find a correlation between CTC positivity and BMI (p=0.94). After chemotherapy CTC were detected in 330 (21.9%) patients. Again, there was no statistically significant correlation between BMI and CTC positivity (p=0.86). In particular, CTC positivity was not observed more frequently in obese patients neither before (p=0.70) nor after chemotherapy (p=0.95) compared to patients with a BMI < 30 kg/m<sup>2</sup>.

## Tables and Figures

**Table 1: Distribution of CTC and BMI before chemotherapy**

	Underweight (UW)	Normal Weight (NW)	Overweight (OW)	Obese (OB)	All patients
CTC negative	18 (75%)	748 (78.6%)	520 (79%)	305 (77.8%)	1591 (78.5%)
CTC positive	6 (25%)	204 (21,4%)	138 (21%)	87 (22.2%)	435 (21.5%)
All patients	24 (1.2%)	952 (47.0%)	658 (32.5%)	392 (19.4%)	2026 (100%)

**Table 2: Distribution of CTC and BMI after chemotherapy**

	Underweight (UW)	Normal Weight (NW)	Overweight (OW)	Obese (OB)	All patients
CTC negative	18 (85.7%)	548 (78%)	375 (77.8%)	233 (78.2%)	1174 (78.1%)
CTC positive	3 (14.3%)	155 (22%)	107 (22.2%)	65 (22.8%)	330 (21.9%)
All patients	21 (1.4%)	703 (46.7%)	482 (32.1%)	298 (19.8%)	1504 (100%)

**Table 3: Patient characteristics**

	Underweight (UW)	Normal Weight (NW)	Overweight (OW)	Obese (OB)	All patients
Age	70 (32-57ys)	53 (26-78ys)	54 (27-75ys)	53 (21-74ys)	53 (21-78ys)
pT1	13 (54.2%)	383 (40.2%)	269 (40.9%)	170 (43.4%)	835 (41.2%)
pT2-4	11 (45.8%)	560 (58.8%)	383 (58.2%)	220 (56.1%)	1174 (57.9%)
pN0	4 (16.7%)	314 (33%)	234 (35.6%)	140 (35.7%)	692 (34.2%)
pN1-3	20 (83.3%)	638 (67%)	425 (64.4%)	252 (64.3%)	1334 (65.8%)
G1	-	55 (5.8%)	29 (4.4%)	15 (3.8%)	99 (4.9%)
G2-3	24 (100%)	888 (93.3%)	624 (94.8%)	375 (95.7%)	1911 (94.3%)
HR neg.	5 (20.8%)	271 (28.5%)	197 (29.9%)	105 (26.8%)	578 (28.5%)
HR pos.	19 (79.2%)	681 (71.5%)	461 (70.1%)	287 (73.2%)	1448 (71.5%)
Her2neu pos.	9 (37.5%)	239 (25.1%)	164 (24.9%)	89 (22.7%)	501 (24.7%)
Her2neu neg.	14 (58.3%)	686 (72.1%)	480 (72.9%)	294 (75.0%)	1474 (72.8%)

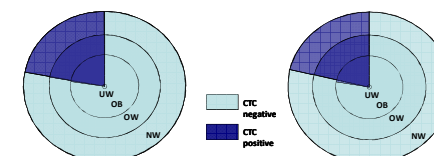


Figure 2: Distribution of CTC positive and negative patients [%] within the groups of body weight before and after chemotherapy

## Conclusion

As compared to patients with normal BMI, there was no significant difference in the prevalence of CTC in underweight, overweight and obese patients, respectively, neither before nor after chemotherapy. The risk factors obesity and prevalence of CTC seem to be independent prognostic factors.

## Acknowledgement



## References

Calle, E. E., et al. "Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults." *N Engl J Med*. 348.17 (2003): 1625-38.  
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