

Short-term Changes in Serum Sex Steroid Levels and Cardiac Function in Healthy Young Men

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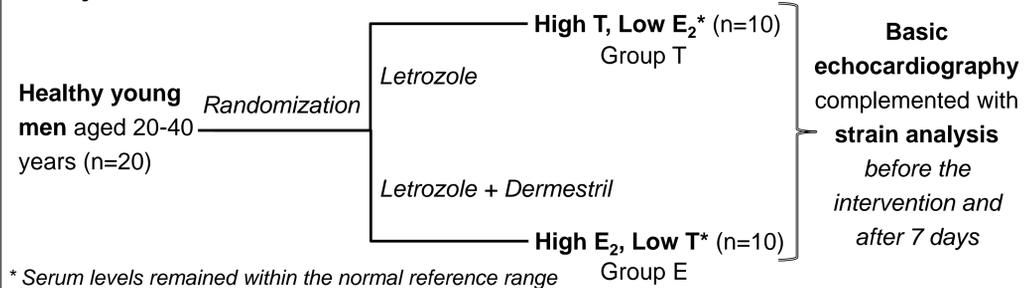


FACULTEIT GENEESKUNDE EN GEZONDHEIDSWETENSCHAPPEN

Background & Aims

- Male obesity is associated with an increase in estradiol (E₂) and a decrease in testosterone (T)
- Direct effects of sex hormones on cardiac structure and function are hardly investigated in humans
- To evaluate the effects of contrasting levels of sex hormones as found in obesity on heart function and structure in young and healthy men

Subjects & Methods



Results

- Total and free E₂ levels were associated with left ventricular ejection fraction (r=0.7, P=0.002 and r=0.6, P=0.007 respectively) at baseline in the whole group (n=20), but not with strain and structural parameters
- Total and free T levels were not significantly associated with functional and structural left ventricular parameters at baseline in the whole group
- In group E, left ventricular global circumferential strain decreased significantly from -17.1% ± 3.88 to -14% ± 2.46 after one week as compared to baseline (P=0.011); however longitudinal and radial strain did not change significantly
- No significant changes in cardiac function were observed in group T
- Left ventricle diameters, thickness and mass index did not significantly differ before and after the intervention in both groups

Parameters	Group T (letrozole only) (n=10)			Group E (letrozole + E ₂ patch) (n=10)		
	Before	After	P value*	Before	After	P value*
Testosterone (ng/dL)	495 ± 138	988 ± 137	<0.001	425 ± 137	246 ± 127	<0.001
Free testosterone (ng/dL)	8.8 ± 2	21.5 ± 4.9	<0.001	9.5 ± 2.2	5.3 ± 2.7	<0.001
Estradiol (pg/mL) †	20.5 (17-23)	8.9 (8.5-9.4)	0.005	16.3 (15.1-19.8)	19.4 (15.9-41.3)	0.059
Free estradiol (pg/mL) †	0.37 (0.3-0.4)	0.18(0.17-0.2)	0.005	0.3 (0.28-0.38)	0.36 (0.28-0.76)	0.074
Ejection fraction (%)	66 ± 6.16	66.7 ± 5.7	0.746	62.3 ± 5.17	65.1 ± 7.61	0.455
Circumferential strain (%)	-20.4 ± 2.88	-20.9 ± 4.73	0.620	-17.1 ± 3.88	-14 ± 2.46	0.011
Longitudinal strain, 2-chamber (%)	-24.2 ± 2.58	-23.3 ± 2.36	0.151	-20.9 ± 2.02	-20.9 ± 2.34	0.696
Longitudinal strain, 4-chamber (%)	-23 ± 2.68	-23.6 ± 2.98	0.563	-20.9 ± 3.2	-20 ± 3.28	0.416
Radial strain (%)	48.9 ± 9.65	50.6 ± 14.94	0.592	52.3 ± 14.76	47.9 ± 7.63	0.465
LV mass index (g/m ²) †	85.4 (81-102)	84.8 (83-94)	0.314	99.5 (85-112)	99.7 (92-114)	0.753

Table 1: Changes in sex steroid profile and cardiac parameters after one week of treatment. Data are means ± SD or median (1st-3rd quartile) in case of non-Gaussian distribution. * According to paired Student *t* test. † According to Wilcoxon Signed Ranks test.

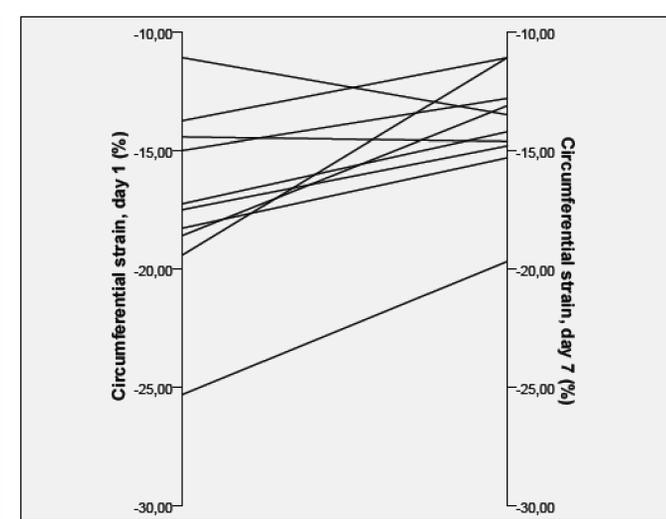
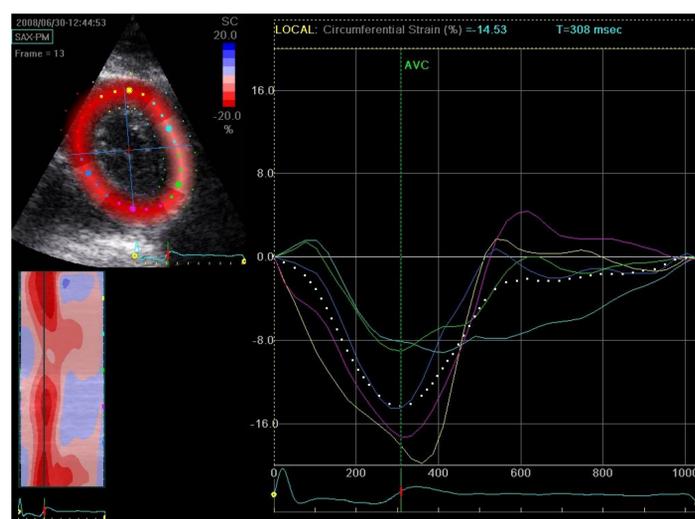
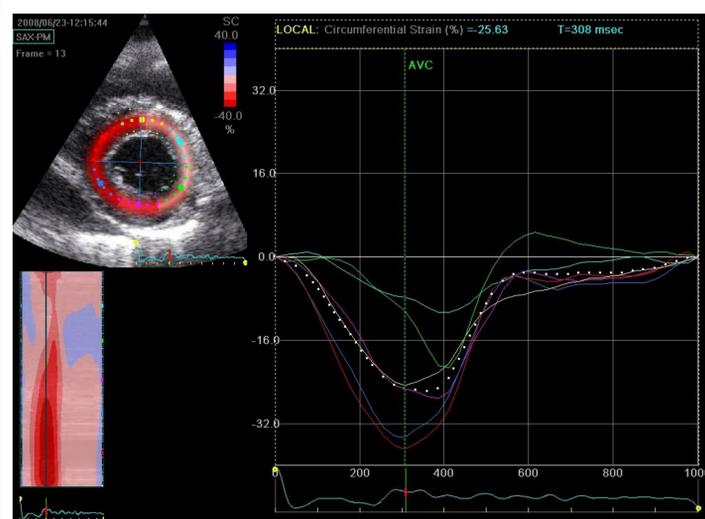


Figure 1: Left ventricular circumferential strain analysis of a patient in group E at the start of the study. The coloured lines represent strain in different regions of the myocardium. The dotted line represents global strain.

Figure 2: Left ventricular strain analysis of the same patient after one week. Note the decrease in global circumferential strain. No dyssynchrony observed.

Figure 3: Changes in global left ventricular circumferential strain during short term letrozole + E₂ patch regimen (P=0.011)

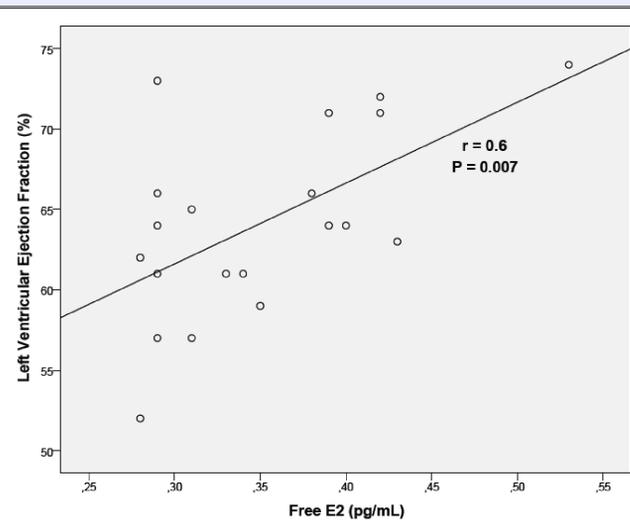
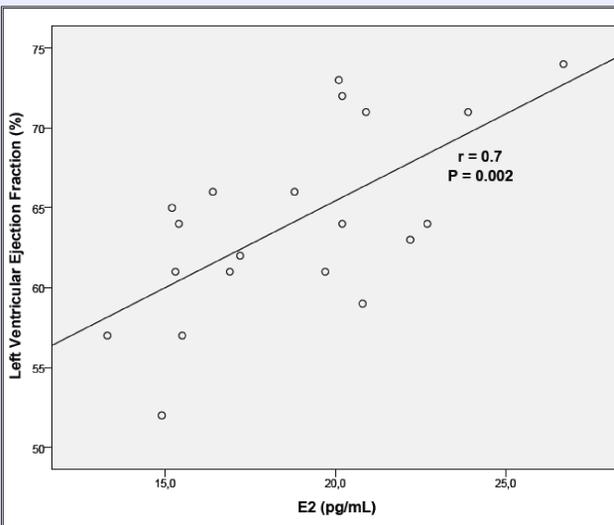


Figure 4: Association between E₂ levels and LVEF

Figure 5: Association between FE₂ levels and LVEF

Summary & Conclusion

- Short-term administration of letrozole plus E₂ in healthy young men, mimicking changes in sex steroid profile as seen in male obesity, significantly decreased left ventricular global circumferential strain, however longitudinal and radial strain did not change significantly.
- At baseline, E₂ was positively associated with left ventricular ejection fraction, however artificially increasing E₂ did not improve and may even negatively affect left ventricular function.
- The finding justifies larger studies of longer duration to discover the exact nature of the impact of sex steroid profile on cardiac function and remodeling in obesity.

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