

Gender differences in arm skin water assessed via 300 MHz
tissue dielectric constant (TDC) measurements

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Skin TDC values obtained at different depths depend on the amount of water contained within the measurement volume from epidermis to the effective measurement depth. Previous work showed TDC values to a 1.5 mm depth were greater in young males than in young females. It was suggested that this difference was in part due to thicker dermis in males. Our goal was to determine if such male-female differences are also present to a 5 mm depth where both dermis and hypodermis are included in the TDC measurement. Thus, TDC was measured to depths of 1.5 and 5.0 mm on both anterior forearms in 50 males and 50 females with ages of 26.2 ± 3.1 and 26.6 ± 3.1 years respectively. Also, percentages of arm fat (FAT%) and muscle mass as a percentage of body weight (MM%) were determined using bioimpedance. Results showed that male TDC values were greater than female at 1.5 mm depth (37.0 ± 2.6 vs. 32.3 ± 3.9 , $p < 0.001$) and at 5.0 mm depth (35.4 ± 7.1 vs. 25.3 ± 4.3 , $p < 0.001$). Within gender, differences between depths were highly significant for females ($p < 0.001$) and marginally significant for males ($p = 0.028$). Bioimpedance results showed female FAT% greater than males ($28.0 \pm 7.2\%$ vs. $16.0 \pm 5.1\%$, $p < 0.001$) and female MM% less ($3.17 \pm 0.25\%$ vs. $4.61 \pm 0.38\%$, $p < 0.001$). These results extend prior findings to now show that male TDC values exceed female values at both 1.5 and 5.0 mm effective depths. Further, based on the now measured arm fat and muscle we can tentatively conclude these gender differences at least partially explain the TDC differences. The closeness of male TDC values at 1.5 and 5.0 mm depths may be due to a combination of greater male skin thickness and muscle mass.

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