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## JOURNAL ARTICLE

# Linear and nonlinear mouse sperm motility patterns. A quantitative classification

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A quantitative method is described for distinguishing two types of mouse sperm motility using a new parameter, the Linear Index. One hundred spermatozoa from C57BL/6-+/+ and 100 spermatozoa from C57BL/6-tw32/+ mice were used to evaluate this parameter. Spermatozoa were tracked by videomicrography, and the following calculated: net displacement velocity,  $V_n$ ; curvilinear velocity of the sperm head,  $V_c$ ; the "average" velocity,  $V_a$  (a 5-point moving average of the track); the progressiveness ratio,  $(V_n/V_c)$ ; the curvilinear progressiveness ratio,  $(V_a/V_c)$ ; and a linear index,  $(V_n/V_a)$ . Frequency histograms of linear index values were bimodal for both groups and each had a clear antimode at 0.5, separating two discrete subpopulations of spermatozoa. Within each group, "linear" (greater than 0.5) and "nonlinear" (less than 0.5) tracks differed in all characteristics; between groups, linear spermatozoa were similar and nonlinear spermatozoa differed only in the curvilinear velocity of the sperm head.

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