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A replacement for Islet equivalents with improved reliability and validity

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Islet equivalent (IE), the standard estimate of isolated islet volume, is an essential measure to determine the amount of transplanted islet tissue in the clinic and is used in research laboratories to normalize results, yet it is based on the false assumption that all islets are spherical. Here, we developed and tested a new easy-to-use method to quantify islet volume with greater accuracy. Isolated rat islets were dissociated into single cells, and the total cell number per islet was determined by using computer-assisted cytometry. Based on the cell number per islet, we created a regression model to convert islet diameter to cell number with a high R 2 value (0.8) and good validity and reliability with the same model applicable to young and old rats and males or females. Conventional IE measurements overestimated the tissue volume of islets. To compare results obtained using IE or our new method, we compared Glut2 protein levels determined by Western Blot and proinsulin content via ELISA between small (diameter ≤ 100 μm) and large (diameter ≥ 200 μm) islets. When normalized by IE, large islets showed significantly lower Glut2 level and proinsulin content. However, when normalized by cell number, large and small islets had no difference in Glut2 levels, but large islets contained more proinsulin. In conclusion, normalizing islet volume by IE overestimated the tissue volume, which may lead to erroneous results. Normalizing by cell number is a more accurate method to quantify tissue amounts used in islet transplantation and research.

Biography

Mujtaba Quadri is a under graduate student of Deccan School of Pharmacy, pursuing Doctor of Pharmacy (PharmD PB I/II), affiliated to Jawaharlal Nehru Technological University.

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