A NEW TEST TO DETECT CHANGES IN TABLET STRENGTH ARISING FROM DIFFERENT DIE SHAPES

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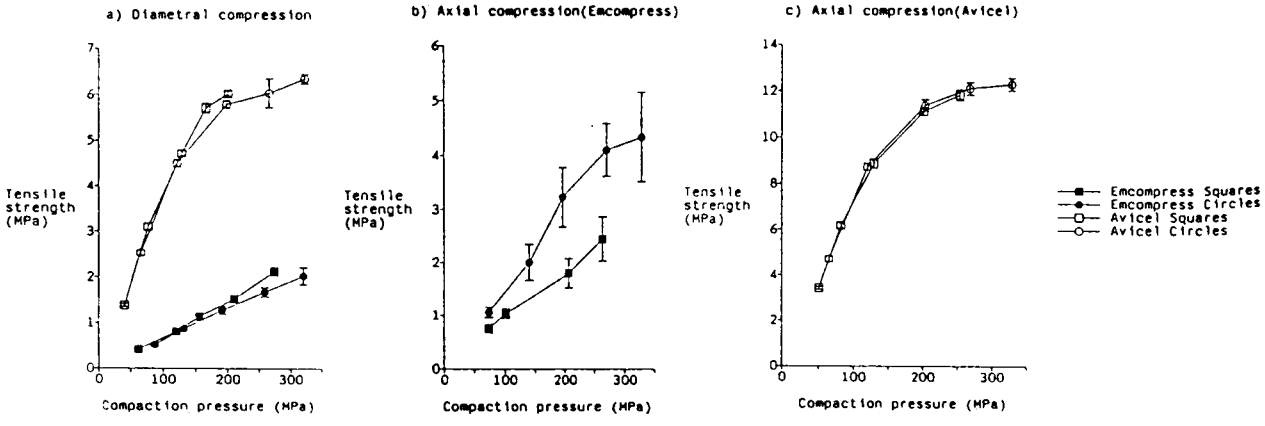
Over the past few years there has been a considerable increase in the use of distinctive tablet shapes. Studies into the effects that the punch and die geometry of such shapes may have on the compaction mechanism and mechanical properties have been limited. The diametral compression test has been used to determine the effects of punch curvature on the tensile strength of tablets (Pitt et al 1989) while indentation hardness has been used on convex tablets (Aulton and Tebby 1975) and on tablets with a raised central dome (Leonard et al 1989). A new test has been used to assess the influence of die geometry on the mechanical strength of compacts.

Avicel PH102 and Emcompress were each mixed with 1% Magnesium Stearate for 3 minutes in a Y-cone mixer. The mixes were compressed using 10mm round, flat faced punches and 10mm (face to face) square, flat faced punches on an instrumented Manesty F3 reciprocating press. Compression weights giving a thickness of 2.8mm at theoretical zero porosity were used. The strengths of the compacts were tested using a CT40 (Engineering Systems), after storage for 2 weeks in tightly closed containers, by two methods; the diametral compression test using semi-circular convex platens with a radius of curvature of 3mm and an axial compression test where the upper and lower faces of the tablets were compressed between the same platens. In both tests the compacts broke into 2 halves. If it is assumed that this indicates tensile failure then the equation described by Fell and Newton (1970) will give a value for the tensile strength (using the inscribed diameter for both shapes).

Figure 1. Tensile strength/Pressure Graphs.



The results indicate that the die shape does not affect the tensile strength values obtained by diametral compression for either excipients (error bars indicate standard deviations) (Fig.1a). For Emcompress, values of the axially derived tensile strength differ between the circular and square compacts (Fig.1b). No such difference is seen with Avicel (Fig.1c). The results demonstrate that the axial compression test provides evidence of variations in tablet strength that are not detected by the traditional diametral compression test.

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