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A Method for Quantitating Flexibility Changes of Pelvic Joints in Rats and Mice.* (21993)

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An increase in flexibility of the pelvic joints in mice occurs during pregnancy and following appropriate hormonal treatment(1-3). This increase was determined by manual manipulation of the pelvis. A more reliable method, suitable for both the mouse and rat, was devised to measure small differences which can be statistically analyzed.

Materials and methods. To quantitate changes in flexibility of the sacroiliac joints the animal is sacrificed, skinned, its body divided at the level of the iliac crests, and the tail severed at the 3rd caudal vertebra. The muscles, which arise in part from the dorsal aspect of the sacrum and 1st caudal vertebra to insert on the extremities, are severed at their origins and reflected laterally. The extremities and pelvic viscera are then removed. All of the musculature attached to the innominate bones is severed close to the bone, except the iliac origins of the sacrospinalis, the iliococcygei (abductor caudae internus), and the pubococcygei (abductor caudae externus; Fig. 1, PC) which are left intact. (Careless removal of the iliac origin of the sacrospinalis might damage the dorsal ligaments of the sacroiliac joint (Fig. 1, SI); the latter 2 muscles hold the ischial tuberosities in a convenient position for making subsequent measurements. Preliminary tests showed that the weight used to flex the sacroiliac joint produced maximum flexion whether or not these muscles were present.) A straight dissecting needle is inserted into the neural canal as far as it can go under moderate pressure (Fig. 1, C). The free end of the needle is slipped into an adjustable clamp which holds the specimen in a horizontal position 2 inches from a transparent plastic protractor (Fig. 1, B. J. M). The specimen's position is adjusted so that the zero line of the protractor is aligned with the dorsal-most portion of the left iliac crest and ischial tuberosity (Fig. 1, F'). To assure constant, correct alignment the positioning of the specimen is performed while viewing it through a hole (4 mm in diameter) in the center of an opaque rectangle (3 x 5 inches) placed 5 inches from the protractor (Fig. 1, A, L). A 50 g weight sufficient to produce a 3°-5° displacement of the ischial tuberosity in normal rats or a 2 g weight sufficient to produce a 1° displacement in normal mice is suspended from the symphysis pubis (Fig. 1, K). A raising of the protractor to realign the zero line with the dorsal-most portion of the iliac crest is necessary at this time because the crest is slightly elevated as the ischial tuberosity is lowered by the weight. While viewed through the hole in the rectangle a movable transparent plastic arm attached to the protractor is lowered by the observer's finger so that a black line running through the length of the arm aligns with the dorsal-most portion of the now displaced ischial tuberosity (Fig. 1, I, G'). Displace-

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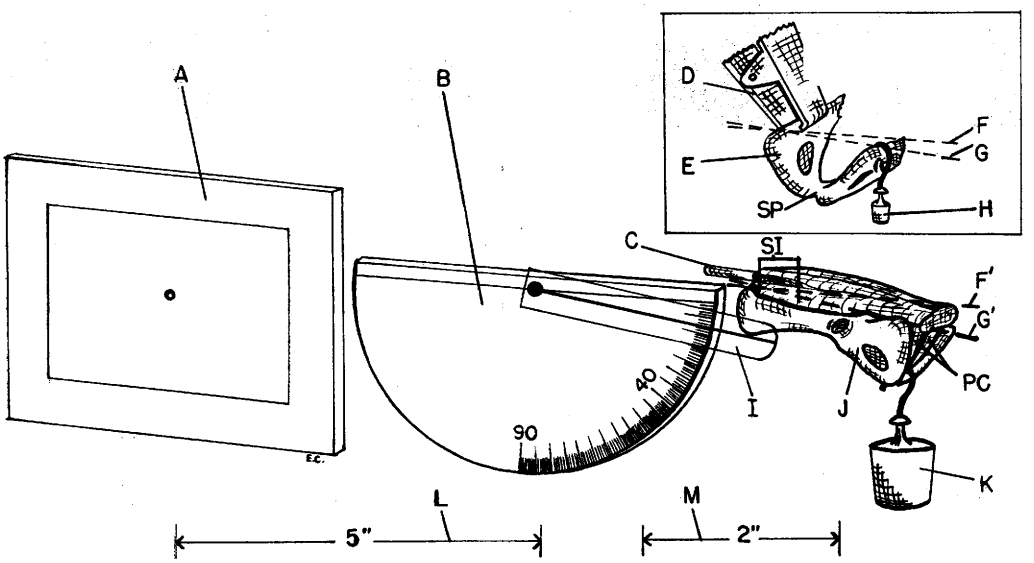

FIG. 1. Diagram of apparatus used for quantitating flexibility changes of pelvic joints in rats and mice. Relative dimensions of rat's pelvis are shown.

ment was measured in degrees at 30 seconds after the weight was applied by recording the position of the line of the arm in relation to the degree markings on the protractor.

To quantitate changes in flexibility of the symphysis pubis of the mouse (Fig. 1, SP) (interpubic synchrondrosis in the rat) the innominate bones are separated from the vertebral column by transecting the ilia close to the acetabula. The left ischium is placed in an adjustable clamp which holds the innominates in a horizontal position (Figs. 1, E; 2).

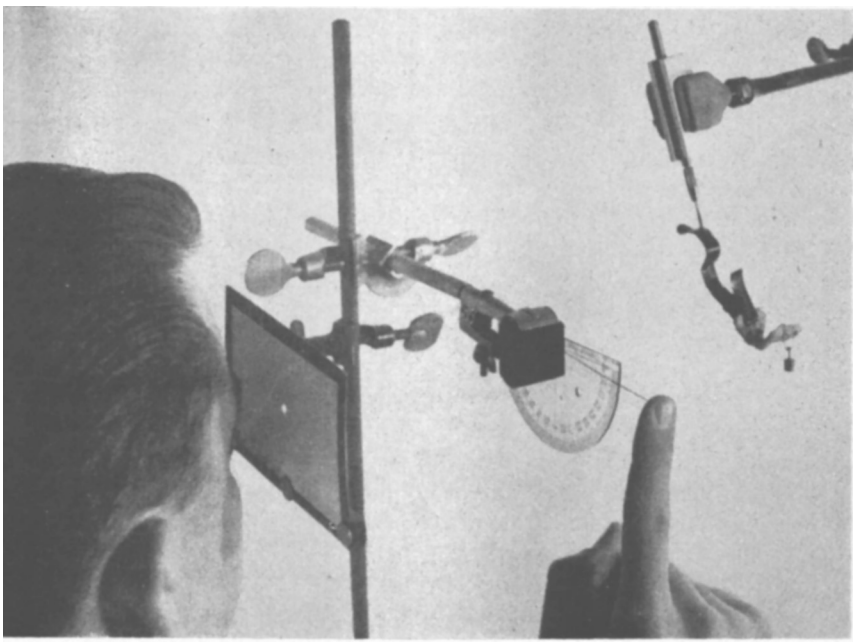

FIG. 2. Photograph of apparatus being used to quantitate flexibility of a rat's interpubic synchrondrosis.

Each ischial tuberosity is 2 inches from the protractor. While viewed through the hole in the rectangle the zero line of the protractor is aligned with the dorsal-most portions of both ischial tuberosities (Fig. 1, F). A weight sufficient to produce a 1° displacement in normal animals (1 g for rat, 0.1 g for mouse) is suspended from the right ischium midway between the tuberosity and the acetabulum (Fig. 1, H). Fifteen seconds from the time the weight was applied the amount of displacement of the right ischial tuberosity is recorded using the arm attached to the protractor in the same manner as described for determining sacroiliac joint flexibility (Fig. 1, G). Once adept, one can perform the entire procedure in less than 10 minutes from the time the animal is sacrificed.

Detailed reports in which this method was used to quantitate changes in pelvic joint flexibility in the rat and mouse during pregnancy and following estrogen and relaxin treatment are forthcoming.

Summary. A method was devised for measuring small differences in pelvic joint flexibility in rats and mice. The procedure in which weights are used to produce joint flexion and a protractor to measure the amount of flexion in degrees is described.

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Response of Mice to Standard Infecting Doses of *Mycobacterium tuberculosis* var. *hominis*.* (21994)

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We described(1) a procedure which could be used to determine the effectiveness of chemotherapeutic agents for the suppression of an experimental tuberculous infection of mice. Data available at that time indicated that the method was highly reproducible. This method now has been applied to the *in vivo* assessment of chemotherapeutic activity for a period of 5 years. Not only has the original estimation of the reliability of the method for this purpose been confirmed, but, in addition, data has been collected during this period which is of importance in regard to the response of untreated normal mice to tuberculous infection. One to 6 groups of untreated normal mice have been infected almost every month during this period. The nature of the response of these untreated control mice to inoculation with a standard infecting dose of *M. tuberculosis* var. *hominis* H37Rv will be the subject of the present communication.

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Method. Since the standardized mouse infection procedure has already been described in detail(1) it will suffice here to state that "Strong A" strain mice weighing between 18 and 22 g were maintained and housed under standard conditions and infected intraven-

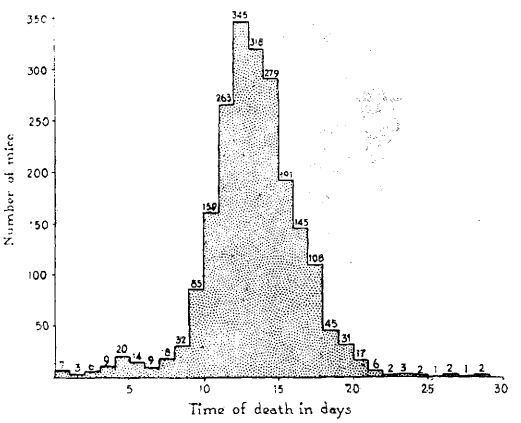

FIG. 1. Distribution of deaths of mice infected with 1.0 mg of H37Rv strain of *M. tuberculosis* var. *hominis*.