



Methods and Devices for Assessing Equine Bone Strength

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BACKGROUND

Skeletal issues in young horses and racing horses present major issues for welfare and performance, according to Kentucky Equine Research. There is a need for improved methods that can be used in a variety of environments and that deliver accurate results.

DESCRIPTION

Developed by researchers at the University of California, Santa Barbara, OsteoProbe®, a simple, FDA-cleared device that quickly measures the strength and quality of bone tissue during a routine field visit, gives a clearer picture of fracture risk than density scans alone. The device has been used to measure 200 thoroughbred racehorses during training, and the preliminary data is compelling. The device has mainly been developed for its human applications (helping doctors make better treatment decisions and improve the safety of orthopedic surgeries), but opportunities exist to develop it for veterinary applications. The OsteoProbe®, uses instrumented indentation testing to microscopically measure bone tissue strength and toughness. It offers a portable, precise, and minimally invasive method to evaluate bone quality, overcoming limitations of traditional radiographic techniques and allowing improved fracture risk assessment in equine patients.

Methods and Instruments for Assessing Bone Fracture Risk

UC Case No. 2005-359

This novel instrument overcomes current diagnostic disadvantages by utilizing a test probe to evaluate material properties of the bone. The tool can be used to assess bone density by creating microscopic fractures in bone. The test is quick and inexpensive, and the resulting fractures are so small that they pose negligible health risks. This new diagnostic information can be used alone or to supplement the results from conventional diagnostics, such as bone mineral density.

Improved Methods and Instruments for Materials Testing

UC Case No. 2007-548

The measurement capabilities of the test probe are extended, making it possible to measure more material properties than just hardness. The measurement head contains a reference probe that rests substantially on the surface of the material being tested and provides a reference for measuring the distance that a test probe indents the material. The

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OTHER INFORMATION

KEYWORDS

equine, horses, bone, bone density, bone strength, bone fracture risk, fracture, bone tissue

CATEGORIZED AS

- ▶ **Veterinary**
- ▶ Diagnostics
- ▶ Large Animal

RELATED CASES

2011-025-0

tool can measure complete force vs. distance curves during one or multiple indentation cycles where the force is the force that the invented instrument supplies during the indentation cycle(s). Additionally, the instrument can be portable and handheld, making it ideal for equine testing.

Improved Instrument for Measuring Fracture Resistance of Hard Tissues

UC Case No. 2011-025

Further refinement of the test probe allows the device to perform reference point indentation without a reference probe. The indentation distance is measured relative to the instrument which remains substantially stationary during the impact process, which occurs on the order of one millisecond. An impact motion with a peak force of order 28N creates an indentation in bone with a depth of approximately 150 μm during which the instrument case moves less than 1 μm . Thus, the error in measuring indentation depth due to the motion of the case is less than 1%, making a reference probe unnecessary.

Self-aligning Probe

UC Case No. 2012-458

A magnetic ball chuck and a self-centering mate create a centered and debris resistant interface for the test probe. This interface allows more precise and reproducible results when measuring on the order of microns as it resists debris buildup between the test probe and chuck interface. The probe also self-centers for precise load transfer and more precise results. The ball chuck, made from hardened steel, absorbs the brunt of the force, reducing the possibility of chips.

ADVANTAGES

- ▶ Portable and handheld design enables use in diverse environments
- ▶ Greater accuracy and precision compared to existing instrumentation
- ▶ Rapid testing process significantly reduces examination time
- ▶ Provides comprehensive material property data beyond simple hardness
- ▶ Minimally invasive with negligible health risk due to microscopic fractures
- ▶ Self-aligning probe improves reproducibility and reduces debris impact

APPLICATIONS

- ▶ Veterinary diagnostics and fracture risk assessment for horses
- ▶ Monitoring and managing developmental orthopedic diseases
- ▶ Evaluation of physitis and osteochondritis conditions
- ▶ Equine sports medicine and welfare optimization
- ▶ Research and clinical studies on equine bone health and materials testing

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,895,104	02/20/2018	2011-025

