

# MRI を利用した靴着用時における 靴のフィット性決定要因の検討

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## Investigation into the Factors that Determine Shoe Fitting Using MRI

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### ABSTRACT

It is essential to purchase suitable shoes that fit the size of users' feet in order to prevent foot injuries in daily life. Although shoe fitting significantly affects the performance of shoes, there are few studies that have either investigated the factors that control shoe fitting or established a method to evaluate shoe fitting.

While, the shape of each foot and shoe was measured to estimate shoe fitting in previous studies, the deformation of feet when wearing shoes had not been taken into consideration. Therefore, we used a Magnetic Resonance Imaging (MRI) system, which allowed us to take images of feet and to observe the deformation of feet while the shoes were being worn, and examined the factors that regulate shoe fitting in this study.

According to results of questionnaires, it is considered that subjects perceive shoe fitting on the ball of the foot. We carried out MRI imaging to research the deformation of feet when wearing shoes by utilizing cross-section images around the ball of the foot, and found that the deformation of feet in the direction of the ball height significantly influences shoe fitting in comparison with that of the foot breadth. This is because deformation in the direction of foot breadth was restricted by the shoe's upper, and

only the deformation in the direction of the ball height was allowed. Since the ball height was decreased and the foot breadth was increased while barefoot through the observation of MRI imaging, it is necessary that the deformation of feet when wearing shoes follow the deformation while barefoot. Therefore, it is important to evaluate shoe fitting around the ball of the foot in the standing position and to purchase suitable shoes that have enough room between shoes and feet, which allows feet to deform in the direction of both the ball height and the foot breadth.

## 要 旨

適切な靴を選ぶ際の重要なポイントの1つは、靴が足にフィットしていること、すなわち、靴のフィット性である。しかし、靴着用時における足部変形に関してあまり調査されておらず、靴のフィット性の評価方法も未だ確立されていない。そこで本研究では、靴着用時の足部変形を撮像可能なMRI装置を用いて靴着用時における靴のフィット性を決定する要因を検討した。アンケート調査により靴のフィット性を評価する部位は、ボール部周辺であることが分かった。靴着用時における足部の高さ方向の変形が足幅方向の変形よりも靴のフィット性に影響を及ぼすことが示唆された。裸足時に足部は高さ方向の厚みが減少して足幅が広がるが、靴着用時にも裸足時と同様な変形が足部に生じることが必要であると考えられる。よって、フィット性の良い靴を購入する際、立位状態で靴のフィット性を評価し、高さ方向にも幅方向にも足部変形が可能なスペースがボール部周辺に存在するような靴を選択することが重要である。