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## A 90-day oral toxicity study on a new strain of *Lactobacillus paracasei* in rats

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### ABSTRACT

*Lactobacillus paracasei* is a species of bacteria that has been suggested to have probiotic benefits. To investigate the subchronic toxicity of *L. paracasei* GW080, a 90-feeding study was conducted in rats. Sprague–Dawley rats were randomly divided into four groups (10 rats/sex/group) and treated with 0, 1.25, 2.5, and 5.0 g/kg body weight (approximately equivalent to 0,  $2.5 \times 10^9$ ,  $5.0 \times 10^9$  and  $1 \times 10^{10}$  cfu/kg bw) of test material by gavage for 90 days. Daily clinical observations and weekly measurement of body weights and food consumption were conducted. Blood samples were obtained on day 46 and day 91 for the measurement of hematology and clinical chemistry parameters. Animals were euthanized for necropsy. Selected organs were weighted and recorded. Histological examination was performed on all tissues from animals in the control and high dose groups. No mortality, body weight, food consumption or treatment-related findings in clinical observations, macroscopic or microscopic examinations were observed. Differences between treated and control groups in some hematology and clinical chemistry parameters were not considered treatment-related. The no-observed-adverse-effect-level (NOAEL) for *L. paracasei* GM080 was considered to be 5.0 g/kg body weight (approximately equivalent to  $1 \times 10^{10}$  cfu/kg bw) for both genders, the highest dose tested.

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### 1. Introduction

Probiotics are live microorganisms which, when administered in adequate amounts, confer a health benefit on the host. Lactobacillus strains have a long history of safe use in fermented food production as one of the most beneficial probiotics (Yoon et al., 2004; Fuller, 1992). Improving digestion and immune function is one of their well-known health benefits (Park et al., 1999; Sanders, 2000). Other beneficial functions of Lactobacillus strains include managing lactose intolerance (Sanders, 2000), lowering cholesterol and blood pressure (Sanders, 2000), reducing inflammation (Reid et al., 2003), and prevention of cancer (Salminen et al., 1974; Sanders, 2000). *Lactobacillus paracasei*, one of seven species in the genus *Lactobacillus*, has two subspecies (*L. paracasei* subsp. *paracasei* and *L. paracasei* subsp. *tolerans*) (Felis and Dellaglio, 2007). *L. paracasei* was used for manufacturing Cheddar and Italian ewe cheeses to sustain high viability in cheese during ripening (Gardiner et al., 1998; Angelis et al., 2001). In addition, studies showed that certain strains of *L.*

*paracasei* could produce anti-bacteria and anti-yeast compounds in human vagina and oral cavity (Atanassova et al., 2003; Ocaña et al., 1999; Sookkhee et al., 2001).

With a growing consumer awareness concerning diet and health, there has been an increasing commercial interest in Lactobacillus supplementation of foods. As a result, many new Lactobacillus strains with probiotic attributes are being introduced into food products. Although traditional Lactobacillus strains have an excellent history of safe use in the formation of dairy products and other foods and some have “generally recognized as safe” (GRAS) status (Donohue and Salminen, 1996), newly isolated organisms often have no previous history of food product use and do not necessarily share the GRAS status of traditional Lactobacillus strains. Therefore, it is necessary and essential to conduct the safety assessment on any new strain with the intent to be added into foods or used as a dietary supplement. This study aims to evaluate the subchronic toxicity of *L. paracasei* GM080 when administered daily by gavage to Sprague–Dawley rats for 90 days.

### 2. Materials and methods

#### 2.1. Study design

Groups of 10 male and 10 female weaning Sprague–Dawley rats were given 0, 1.25, 2.5, and 5.0 g/kg body weight *L. paracasei* GM080 by gavage, respectively. Clinical observations were recorded daily. Body weights and food consumption

**Abbreviations:** EDTA, ethylenediaminetetraacetic acid; FDA, Food and Drug Administration; GLP, good laboratory practice; GRAS, generally recognized as safe; NOAEL, no-observed-adverse-effect-level; SPSS, Statistics Package for Social Science.

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