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SCIENTIFIC OPINION

Pacran®, a powder obtained from cranberries, and defence against bacterial pathogens in the lower urinary tract: Evaluation of a health claim pursuant to Article 13(5) of Regulation (EC) No 1924/2006

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The declarations of interest of all scientific experts active in EFSA's work are available at https://open.efsa.europa.eu/experts

Abstract

Following an application from Givaudan, submitted for authorisation of a health claim pursuant to Article 13(5) of Regulation (EC) No 1924/2006 via the Competent Authority of Italy, the EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA) was asked to deliver an opinion on the scientific substantiation of a health claim related to Pacran® and defence against bacterial pathogens in the lower urinary tract. The Panel considers that the food Pacran®, a powder obtained from cranberries, is sufficiently characterised. Defence against bacterial pathogens in the lower urinary tract is a beneficial physiological effect. The applicant identified two human intervention studies which investigated the effect of Pacran® on the incidence of urinary tract infections (UTI) as being pertinent to the claim. In weighing the evidence, the Panel took into account that one human intervention study showed a beneficial effect of Pacran® consumed daily at doses of 500 mg for 6 months on the incidence of symptomatic, culture-confirmed UTI in women with a history of recurrent UTI, whereas such an effect was not consistently observed in another study under similar conditions. The Panel also took into account that limited evidence has been provided for a mechanism by which Pacran® could exert the claimed effect. The Panel concludes that the evidence provided is insufficient to establish a cause and effect relationship between the consumption of Pacran® and the defence against bacterial pathogens in the lower urinary tract.

KEYWORDS

cranberry, health claim, urinary tract infection

CONTENTS

1 | INTRODUCTION

1.1 | Background and Terms of Reference as provided by the requestor

Regulation (EC) No 1924/2006 harmonises the provisions that relate to nutrition and health claims, and establishes rules governing the Community authorisation of health claims made on foods. As a rule, health claims are prohibited unless they comply with the general and specific requirements of this Regulation, are authorised in accordance with this Regulation, and are included in the lists of authorised claims provided for in Articles 13 and 14 thereof. In particular, Article 13(5) of this Regulation lays down provisions for the addition of claims (other than those referring to the reduction of disease risk and to children's development and health), which are based on newly developed scientific evidence or include a request for the protection of proprietary data, to the Community list of permitted claims referred to in Article 13(3). According to Article 18 of this Regulation, an application for inclusion in the Community list of permitted claims referred to in Article 13(3) shall be submitted by the applicant to the national competent authority of a Member State, which will make the application and any supplementary information supplied by the applicant available to the European Food Safety Authority (EFSA).

1.2 | Interpretation of the Terms of Reference

EFSA is requested to evaluate the scientific data submitted by the applicant in accordance with Article 16(3) of Regulation (EC) No 1924/2006. On the basis of that evaluation, EFSA will issue an opinion on the scientific substantiation of a health claim related to Pacran® and defence against bacterial pathogens in the lower urinary tract.

The present opinion does not constitute, and cannot be construed as, an authorisation for the marketing of Pacran®, a positive assessment of its safety, nor a decision on whether Pacran® is, or is not, classified as a foodstuff. It should be noted that such an assessment is not foreseen in the framework of Regulation (EC) No 1924/2006.

In the context of this opinion, the term 'dietary fibre' is used as synonymous of non-digestible carbohydrates (EFSA NDA Panel, 2010) and not as defined by Regulation (EU) 1169/2011, which sets the additional requirement of having a beneficial physiological effect for edible carbohydrate polymers obtained from food raw material by physical, enzymatic or chemical means, and for edible synthetic carbohydrate polymers.

It should also be highlighted that the scope, the proposed wording of the claim and the conditions of use as proposed by the applicant may be subject to changes, pending the outcome of the authorisation procedure foreseen in Article 18(4) of Regulation (EC) No 1924/2006.

2 | DATA AND METHODOLOGIES

2.1 | Data

Information provided by the applicant

See also the section Steps taken by EFSA at the end of this opinion.

Food/constituent as stated by the applicant

According to the applicant, the food for which the health claim is made is a '*Dried cranberry powder, a proprietary ingredient sold under the brand name Pacran®*'. The powder is 'obtained from the North American cranberry fruit (*Vaccinium macrocarpon* Aiton).'

Health relationship as claimed by the applicant

According to the applicant, the health effect relates to the defence against bacterial pathogens in the lower urinary tract.

'The specific body function that is the subject of the claimed effect is the defence against pathogens. The site of infection is the lower urinary tract, which refers to the bladder and the urethra. The pathogenic microorganisms are bacteria.' The outcome variable proposed to assess the claimed effect is the *'incidence of symptomatic culture-confirmed UTI*[1] *(≥ 10^5 CFU/mL). The symptoms of UTI are proposed to be diagnosed clinically and the UTI is proposed to be confirmed by microbiological culture urinalysis of a clean-catch mid-stream urine sample and the individual uropathogens identified'*.

[1]UTI: urinary tract infections, CFU: colony forming units.

Mechanism by which the food/constituent could exert the claimed effect as proposed by the applicant

The applicant claims that the effect derives from *'cranberry compounds to interfere with bacterial adhesion in the urinary tract. This anti-adhesive property is believed to reduce the ability of bacteria to colonise the urinary tract. If bacteria are unable to adhere to uroepithelial cells, they cannot grow and cannot trigger an infection'*. According to the applicant, *'cranberry compounds may interfere with the formation of bacterial biofilms on the uroepithelial cells'*. Some organic acids in cranberry may have *'antibacterial effects'*. Additionally, *'the crosstalk between cranberry compounds and the gut microbiome may potentially impact the susceptibility to UTIs'*. These *'cranberry compounds'* include *'proanthocyanidin with type A linkage'*, *other phenolic compounds and phenolic metabolites'* and *'soluble dietary fibres'*.

Wording of the health claim as proposed by the applicant

The applicant has proposed the following wording for the health claim *'Dried cranberry powder contributes to the defence against bacterial pathogens in the lower urinary tract'*.

Specific conditions of use as proposed by the applicant

According to the applicant, the target population for the intended health claim is *'adult women with a history of recurrent UTI'*. The recommended dose of Pacran® proposed by the applicant to achieve the claimed effect is *'500 mg of dried cranberry powder once daily'*.

Data provided by the applicant

The health claim application on Pacran® pursuant to Article 13(5) of Regulation (EC) No 1924/2006 was presented in a common and structured format as outlined in the Scientific and technical guidance for the preparation and presentation of a health claim application (EFSA NDA Panel, 2021b).

As outlined in the General scientific guidance for stakeholders on health claim applications (EFSA NDA Panel, 2021a), it is the responsibility of the applicant to provide the totality of the available evidence.

The applicant has submitted a confidential and a non-confidential version of a dossier following the General scientific guidance for stakeholders on health claim applications (EFSA NDA Panel, 2021a) and the Scientific and technical guidance for the preparation and presentation of a health claim application (EFSA NDA Panel, 2021b).

The application contains personal data claimed as confidential by the applicant: names, addresses, signatures, email and telephone of natural persons, details of the analytical methods and quantitative values.

The application contains data claimed as proprietary: data supporting the characterization of the food/constituent, Vostalova et al. (2015). study, unpublished study A (human intervention study), unpublished study B (meta-analysis of human intervention studies) unpublished studies C and D (ex vivo studies).

In accordance with Art. 38 of Regulation (EC) No 178/2002,[2] and taking into account the protection of confidential information and of personal data in accordance with Articles 39a to 39e of the same Regulation, and of the Decision of EFSA's Executive Director laying down practical arrangements concerning transparency and confidentiality,[3] the non-confidential version of the dossier has been published in the OpenEFSA portal.[4]

2.2 | Methodologies

The approach used by the NDA Panel for the evaluation of health claims is explained in the General scientific guidance for stakeholders on health claim applications (EFSA NDA Panel, 2021a). In assessing each specific food/health relationship, which forms the basis of a health claim, the NDA Panel considers the following key criteria:

(i) the food/constituent is defined and characterised;
(ii) the claimed effect is based on the essentiality of a nutrient; OR the claimed effect is defined and is a beneficial physiological effect for the target population and can be measured in vivo in humans;
(iii) a cause and effect relationship is established between the consumption of the food/constituent and the claimed effect (for the target group under the proposed conditions of use).

Each of these three criteria needs to be assessed by the NDA Panel with a favourable outcome for a claim to be substantiated. In addition, an unfavourable outcome of the assessment of criterion (i) and/or (ii) precludes the scientific assessment of criterion (iii).

[2]Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, pp. 1–48.
[3]Decision available at: https://www.efsa.europa.eu/sites/default/files/corporate_publications/files/210111-PAs-pre-submission-phase-and-public-consultations.pdf.
[4]https://open.efsa.europa.eu/questions/EFSA-Q-2022-00411.

The scientific requirements for health claims related to 'the defence against bacterial pathogens in the lower urinary tract', are outlined in a specific EFSA guidance on the scientific requirements for health claims related to the immune system, the gastrointestinal tract and defence against pathogenic microorganisms (EFSA NDA Panel, 2016).

2.3 | Public consultation

According to Art. 32c(2) of Regulation (EC) No 178/2002 and to the Decision of EFSA's Executive Director laying down the practical arrangements on pre-submission phase and public consultations, EFSA carried out a Public Consultation on the non-confidential version of the application from 5 February 2025 to 26 February 2025 (PC-1304) for which no comments were received.

3 | ASSESSMENT

3.1 | Characterisation of the food/constituent

The food proposed by the applicant as the subject of the health claim is Pacran®, a cranberry powder obtained from a blend of whole North American cranberries (*V. macrocarpon, syn. V. macrocarpon* Aiton *or V. macrocarpon L*).

Pacran® consists of dried cranberry solids. The applicant claims that several food constituents in Pacran® (proanthocyanidins with type A linkage, other phenolic acids and its metabolites, organic acids and soluble dietary fibres) are responsible for the claimed effect.

Proanthocyanidins (PACs) are oligomers and polymers of flavan-3-ols (catechins and epicatechins) with type A or B linkages between the monomeric units. The type A linkages are restricted to cranberries and a few other common foods (Gu et al., 2004). The content of flavan-3-ols as monomers (catechins and epicatechins) was measured by high-performance liquid chromatography (HPLC), the content of [redacted] PACs by the Brunswick Laboratory 4-dimethylaminocinnamaldehyde (BL-DMAC) colorimetric assay (Prior et al., 2010) with the use of A2 dimer standard, and the content of [redacted] PACs by the [redacted] The percentage of type A and type B linkages in PACs was assessed by liquid chromatography–high resolution mass spectrometry (LC–HRMS). The [redacted] of flavan-3-ols [redacted] and [redacted] (PACs) was assessed by HPLC–fluorescence detection (FLD). The [redacted] and [redacted] PAC content, the abundance of type A and B linkages and the [redacted] of flavan-3-ol [redacted] were specified. The Panel considers that the analytical methods used for the quantification of above-mentioned food constituents are appropriate.

Pacran® also contains other flavonoids such as anthocyanins and flavonols, as well as phenolic acids and non-phenolic organic acids (such as quinic acid, citric acid and malic acid). Flavonoids were measured by HPLC coupled with UV/visible detection, whereas phenolic acids and organic (non-phenolic) acids were measured by HPLC coupled with a mass detector. Based on the analysis of 5 batches, the applicant provided ranges for the content of individual phytochemicals per 100 g of dried cranberry powder.

[redacted] oligosaccharides in Pacran®, mainly [redacted], and total dietary fibre, were quantified.

Information about the manufacturing process, the stability and the batch-to-batch variability has been provided. The content of flavonoids (including monomeric and polymeric units of flavan-3-ols), non-phenolic organic acids and dietary fibre in cranberry products can be measured by established methods.

The Panel considers that Pacran®, a powder obtained from cranberries which is the subject of the health claim, is sufficiently characterised in relation to the claimed effect.

3.2 | Relevance of the claimed effect to human health

The claimed effect proposed by the applicant is 'defence against bacterial pathogens in the lower urinary tract'. The proposed target population is 'adult women with a history of recurrent urinary tract infection (UTI)'.

Presence of bacteria in the urinary tract may cause symptomatic UTIs. UTI is the most common infection in girls and women, with the incidence rising with age and sexual activity. Symptomatic UTIs are usually accompanied by bacteriuria at levels of $\geq 10^5$ CFU/mL of mid-stream urine, and it has been estimated that uropathogenic strains of *Escherichia coli* are the most common cause of UTIs (Ronald, 2002).

The scientific evidence for the substantiation of function claims related to defence against pathogens in the lower urinary tract can be obtained from human intervention studies showing an effect on clinical outcomes related to UTIs (e.g. incidence, severity and/or duration of symptoms). With respect to the study group, subjects without an infection at baseline, including subjects at high risk for infection without an infection at baseline, could be suitable study groups for the scientific substantiation of claims on defence against pathogens (EFSA NDA Panel, 2016).

The endpoint proposed by the applicant to assess the claimed effect in human intervention studies is the incidence of symptomatic, culture-confirmed (bacteriuria at levels $\geq 10^5$ CFU/mL) UTI in adult women at high risk of UTI (i.e. with a history of recurrent UTI) and no UTI at baseline.

The Panel considers that defence against bacterial pathogens in the lower urinary tract is a beneficial physiological effect.

3.3 | Scientific substantiation of the claimed effect

The applicant performed a literature search in January 2024 in the databases MEDLINE and ScienceDirect without time or language restriction to retrieve human studies using keywords in relation to the food constituent (cranberry, *V. macrocarpon*, Pacran, proanthocyanidin) and keywords related to the claimed effect (urinary tract, urinary tract infection, UTI, bladder infection, kidney infection, renal infection, cystitis, pyelonephritis, bacteriuria, pyuria, dysuria, polyuria, oliguria, haematuria, anti-adhesion, anti-adherence, adhesion, adherence, bacterial pathogen, pathogenic microorganism, pathogenic organism, uropathogen, E. coli). The full search strategy with keywords, the PICO question (Population, Intervention, Comparators, Outcomes) and eligibility criteria were provided by the applicant.

From the literature search, the applicant identified two published human intervention studies investigating the effect of Pacran® supplementation on the incidence of UTI in women (Sengupta et al., 2011; Vostalova et al., 2015). In a previous opinion (EFSA NDA Panel, 2014), the NDA Panel evaluated Sengupta et al. (2011) and an unpublished study (referred to as 'unpublished study A' in that assessment in 2014). The Panel could not draw conclusions from Sengupta et al. (2011) due to methodological limitations of the study, prompting the applicant to exclude it from the current application. The previously unpublished study A has since been published as Vostalova et al. (2015). For the present application, in response to an additional data request (ADR), the applicant provided the full study report for Vostalova et al. (2015) and is considered as pertinent for the scientific substantiation of the claim.

In the current application, the applicant also submitted one unpublished human study (unpublished study A, claimed as proprietary by the applicant), including the protocol, the statistical analysis plan and the study report, and one meta-analysis (unpublished study B, claimed as proprietary by the applicant), pooling the results from the two studies (Vostalova et al., 2015; unpublished study A), as pertinent for the claim.

Two systematic reviews of randomised controlled trials (RCTs) were also submitted by the applicant. The first systematic review focused on non-antibiotic options for the prevention or treatment of uncomplicated UTIs in adult women (Konesan et al., 2022). Among the 12 studies testing cranberry products, only one used Pacran® (Vostalova et al., 2015). The second review, a systematic review and meta-analysis (Williams et al., 2023) addressed the efficacy of various cranberry products (juice, powder or tablets) in reducing the risk of UTIs across different population groups. This review included 50 RCTs, with 45 RCTs evaluating the effect of cranberry products on the incidence of symptomatic, culture-verified UTIs compared to placebo, water or no specific treatment. Of these, 26 RCTs provided sufficient data for a meta-analysis. A subgroup analysis restricted to women with recurrent UTIs included eight studies with 1555 participants. Only two studies within this subgroup (Sengupta et al., 2011; Vostalova et al., 2015) investigated the effects of Pacran®.

The Panel considers that no conclusions can be drawn from these systematic reviews for the scientific substantiation of the claim, as it is unclear whether the cranberry products used in most of the included RCTs meet the specifications provided for Pacran®, the food that is the subject of the claim. The Panel notes that the two RCTs conducted with Pacran® (Sengupta et al., 2011; Vostalova et al., 2015) had already been identified by the applicant during the literature search.

Human intervention studies

Two human intervention studies (Vostalova et al., 2015; unpublished study A) have investigated the effect of a cranberry powder on the first recurrence of UTI. The applicant claims that the cranberry powder used in both studies complies with the confidential specifications provided for Pacran®.

A double-blind, randomised, parallel, two-arms, placebo-controlled, single-centre study (Vostalova et al., 2015) was conducted in sexually active women. Women with at least two episodes of UTI treated with antibiotics in the previous year were recruited. Participants with symptomatic UTI at baseline, diseases (related to the urinary tract, sexually transmissible diseases, immunodepression, cardiovascular disease, gastrointestinal, metabolic, renal, hepatic, neurological or active musculoskeletal disorders) or taking medications affecting the urinary tract, and pregnant and/or breast-feeding women were excluded. 182 women aged 17–75 years were randomised to consume either Pacran® containing 0.56% soluble PACs measured by the BL-DMAC method (Prior et al., 2010) at a dose of 500 mg/day ($n = 89$) or placebo ($n = 93$) daily for 6 months. Pacran® and placebo capsules were identical in appearance. Compliance was assessed using the number of left-over capsules at each visit (at weeks 12, 24 and at the last treatment day), and product intake was reported on a daily dietary card.

The primary endpoint was the first recurrence of symptomatic UTI, defined as one or more symptoms (pollakiuria, burning sensation on micturition, haematuria or turbid urine or malodorous urine, sub-pelvic pain, genital pruritus, fever, dysuria) and the presence of bacteriuria at levels $\geq 10^5$ CFU/mL. If a UTI was confirmed, the intake of the study products was paused during antibiotic treatment. In response to an ADR, the applicant explained that the intervention product was paused to avoid any potential interaction between Pacran® and the antibiotic treatment. Additionally, this pause represented 3–6 days out of the 184 days of follow-up. The proportion of women experiencing at least one UTI during the study was modelled using a log–log binomial regression adjusted for age, age-adjusted history of UTI and log observation time as an offset term. Secondary endpoints included time to first recurrence of symptomatic UTI (Cox regression analysis), total

number of UTI during the 6 months of the study (Poisson regression analysis), bacteria identification and count in urine and urinalysis.

In the publication, the results were presented for 176 women ($n = 83$ in the Pacran® group and $n = 93$ in the placebo group). Six participants from the Pacran® group were excluded from the statistical analysis because they did not meet the inclusion criteria: three were younger than 18 years and three had only one episode of UTI in the previous 12 months. The Panel notes that only the Pacran® group was affected by these exclusions. As mentioned in the previous opinion on Pacran® (EFSA NDA Panel, 2014), protocol deviations related to the age criteria in the initial analysis from the publication (exclusion of three women younger than 18 years and inclusion of three women older than 60 years) were not treated equally. Upon request by EFSA, the applicant provided the full study report. The Panel noted inconsistencies between the full study report and the published study (Vostalova et al., 2015) for the age eligibility criterion (18–60 years in the protocol and 18–75 years in the published article) and for baseline characteristics (values in the Pacran® group are identical for the 89 randomised participants in the publication and the 83 participants analysed in the study report). The applicant clarified that there was a mistake in the descriptive table of the publication by Vostalova et al. (2015).

In the study report, the intention-to-treat (ITT) analysis on 182 randomised women (including six completers initially excluded) did not show statistically significant differences between groups for the primary outcome ($n_{placebo} = 93$, $n_{Pacran} = 89$, RR = 0.50 [95% CI: 0.25; 1.02], $p = 0.06$). Additional sensitivity analyses excluding women < 18 years old ($n_{placebo} = 93$, $n_{Pacran} = 86$, RR = 0.43 [95% CI: 0.20; 0.95], $p = 0.03$), excluding women with one episode of UTIs in the last year ($n_{placebo} = 93$, $n_{Pacran} = 86$, RR = 0.52 [95% CI: 0.25; 1.06], $p = 0.07$) or both ($n_{placebo} = 93$, $n_{Pacran} = 83$, RR not reported, $p = 0.04$), showed that the effect of Pacran® on the primary outcome varied across analyses, and that the statistical significance of the results depended on unjustified exclusions upon protocol violations, all occurring in the Pacran® group. The Panel considered that this study did not show an effect of Pacran® on defence against bacterial pathogens in the lower urinary tract (EFSA NDA Panel, 2014).

In the current application, the applicant provided a re-analysis considering the 182 randomised participants using a log Poisson generalised linear model (GLM) with robust variance. The applicant claimed that this new analytical model, used in the new study provided (unpublished study A; claimed as proprietary by the applicant), is 'more adapted' and 'less complex' because the model used in the study report included a term for the quadratic association between age and UTI history and multiple variable centering. The Panel considers that the applicant did not demonstrate with quantitative indicators the superiority of this new statistical model over the previous one. This new analysis showed statistically significant differences between groups in relation to the primary outcome ($n = 182$, $n_{placebo} = 93$, $n_{Pacran} = 89$, $p = 0.04$). Upon request by EFSA, the applicant provided additional sensitivity analyses excluding participants who did not meet the inclusion criteria for age (< 18 years and > 60 years; $n_{placebo} = 90$, $n_{Pacran} = 84$; odds ratio, OR = 0.44 [95% CI: 0.21; 0.92], $p = 0.03$), for UTI history (< 2 UTIs in the previous 12 months; $n_{placebo} = 93$, $n_{Pacran} = 86$; OR = 0.56 [95% CI: 0.29; 1.06], $p = 0.08$), or both ($n_{placebo} = 90$, $n_{Pacran} = 81$; OR = 0.45 [0.21; 0.94], $p = 0.03$). The Panel notes that the findings of the relevant sensitivity analyses are not consistent with those from the primary analysis of the effect of Pacran® on the primary outcome.

The Panel notes that the choice of the statistical model and the application of exclusion criteria based on age and UTI history play a significant role in determining the magnitude and statistical significance of the effect, and that the lack of quantitative indicators to justify the new post-hoc statistical analysis and the protocol deviations undermine the robustness of the findings. Consequently, the new post-hoc statistical analysis provided by the applicant does not justify a revision of the previous conclusions by the EFSA NDA Panel (2014) on the study by Vostalova et al. (2015). The Panel considers that this study does not show a consistent effect of Pacran® on the incidence of UTI.

A double-blind, randomised, parallel, two-arms, placebo-controlled, multicentre study at five sites in Australia, was conducted in women aged 18–65 years (unpublished study A). Women aged 18–65 years with a BMI between > 17.5 and < 35 kg/m^2 and with 2–4 UTIs in the last 6 months (or ≥ 3 UTIs treated with antibiotics in the last year) were recruited. Participants with a history of > five UTIs in the last 6 months, history or major diseases (immunodepression, cardiac, liver, gastrointestinal, urological, renal or metabolic disorders) or those taking *Vaccinium* containing products, antibiotics or medications affecting urinary tract and pregnant and/or breast-feeding women were excluded.

A total of 150 women were randomised to consume either 500 mg/day of Pacran® containing ~0.4% soluble PACs measured by the BL-DMAC method ($n = 75$) or placebo (soy oil, $n = 75$) for 6 months (unpublished study A). Pacran® and placebo capsules were identical in appearance and compliance was assessed by counting the number of returned capsules at each visit (on days 29, 57, 85, 113, 141 and 169).

The primary endpoint was the incidence of cultured confirmed UTI at a level of > 10^5 CFU/mL measured using log Poisson regression with robust variance. Secondary endpoints included incidence of symptomatic suspected UTI, incidence of culture positive UTI symptoms, time to first UTI, total number of UTIs, proportion of participants with two or more UTIs and change in uropathogen presence and count on culture.

A total of 14 participants (11 in the placebo group and 3 in the Pacran® group) withdrew or were lost to follow-up. The full analysis set (FAS) included all randomised participants with at least one dose of study treatment (Pacran® or placebo), and with at least one post-baseline value for the primary outcome. Five randomised participants were excluded from the FAS analysis (three in the placebo group and two in the Pacran® group). In FAS, 72 women in the placebo group and 73 women in the Pacran® group were analysed. The FAS analysis on 145 women showed a statistically significant effect of Pacran® on the incidence of UTI as compared to placebo (relative risk, RR = 0.48 [0.26; 0.87], $p = 0.01$). Among the secondary endpoints, Pacran® increased the time to first culture-confirmed UTI (hazard ratio, HR = 0.36 [0.18; 0.74], $p = 0.01$) and reduced the total number of UTIs per participant (incident rate ratio, IRR = 0.41 [0.21; 0.79], $p = 0.01$), and the incidence of cultured positive UTI

symptoms (frequency of urination) (RR = 0.29 [0.13; 0.63], $p < 0.01$), but not the incidence of symptomatic suspected UTI, the presence of specific bacteria on culture or the incidence of other culture positive UTI symptoms (dysuria). The per protocol (PP) analysis of 107 women complying with the interventions (58 in the placebo group and 59 in the Pacran® group) did not show statistically significant differences between groups for the primary outcome or the secondary outcomes (time to first UTI, total number of UTI). Upon request by EFSA, the applicant claimed that the reduction in sample size could explain the different results obtained in relation to the primary outcome in the FAS and PP analyses. The Panel notes that the recruitment was terminated prematurely and only 150 participants were recruited instead of 300 participants, as planned in the protocol. According to the applicant, the original sample size was estimated to detect an absolute reduction of 15% in the rate of symptomatic UTI recurrence between groups (80% power, 5% alpha, 10% dropout rate) given an incidence in the control group of 35%. The final sample size calculation could detect an absolute reduction of 19% in the rate of symptomatic UTI recurrence between groups (80% power, 5% alpha) given a lower incidence in the control group (30%).

The Panel considers that this study (unpublished study A) shows a beneficial effect of Pacran® when consumed daily at doses of 500 mg for 6 months on the incidence of symptomatic, culture-confirmed UTI in women with a history of recurrent UTI infections.

Meta-analysis

The applicant conducted a meta-analysis (unpublished study B) pooling the results on the incidence of UTIs from the two human intervention studies described above (Vostalova et al., 2015; unpublished study A). To that end, the results from the new post-hoc, ITT statistical analysis for the study by Vostalova et al. (2015) were used. The Panel notes that the model specification for the re-analysis of one study (Vostalova et al., 2015) has not been quantitatively justified and that the methodological choices and codes for the meta-analysis have not been sufficiently described. The Panel considers that this meta-analysis does not provide additional evidence for the scientific substantiation of the claim beyond that provided by the individual studies.

Mechanism of action

The applicant acknowledges that the precise mechanism by which Pacran® could exert a protection against bacterial pathogens in the lower urinary tract is not fully elucidated. The following hypothesis have been proposed:

a. Anti-adhesive activity (AAA)

Cranberry compounds could interfere with the adhesion of bacterial pathogens (e.g. P-fimbriated *Escherichia coli*) to uroepithelial cells and reduce their capacity to colonise the urinary tract.

In support of this mechanism, the applicant provided two studies showing that the consumption of cranberry juice was associated with an increase in phenolic compounds and benzoic acids in plasma, and that these cranberry polyphenols were excreted in urine (Feliciano et al., 2016; Liu et al., 2015). The applicant also submitted two double-blind, cross-over RCTs which evaluated ex vivo the AAA on bacteria in urine of healthy volunteers following the consumption of 500 mg of a cranberry powder complying with the specifications for Pacran® (as claimed by the applicant) using the standard human red blood cell haemagglutination assay (unpublished studies C and D; claimed as proprietary by the applicant). The urine of individuals consuming Pacran® was more effective in inhibiting adhesion of P-fimbriated *E. coli* to red blood cells than that of individuals on placebo.

Proanthocyanidins type A (PAC-A) have been shown to decrease adhesion of P-fimbriated *E. coli* to urinary bladder cells in vitro (Howell et al., 1998) at much higher concentrations than those found in the urine of animals or humans consuming cranberry products (de González Llano et al., 2019, 2020). In addition, about [redacted] (Section 3.1). Whereas catechin and epicatechin monomers, and rarely dimers, can be absorbed intact in the small intestine, oligomers and polymers are extensively metabolised by the gut microbiota into low molecular weight phenolics (Manach et al., 2005; Prior & Gu, 2005; Serrano et al., 2009). The Panel agrees with the statement of the applicant that PAC-A are unlikely to be responsible for the AAA of dried cranberry powder observed ex vivo.

The applicant claimed that other cranberry phenolic compounds have shown AAA in vitro at concentrations that are closer to those excreted in urine upon consumption of cranberry products (de González Llano et al., 2019; de Llano et al., 2015; Mena et al., 2017) and that additive or synergistic effects could explain the AAA of Pacran® ex vivo (de González Llano et al., 2019). The applicant also claimed that soluble oligosaccharides in cranberry products could also contribute to the AAA, as they are absorbed and excreted in urine as shown in sows (Coleman et al., 2019; Coleman & Ferreira, 2020), and could prevent the formation of bacterial biofilms as shown in vitro (Sun et al., 2015).

The Panel notes that several health claim applications related to the effects of cranberry products standardised by their PAC content on the AAA of urine from subjects consuming cranberry products have already been evaluated by EFSA (EFSA, 2009; EFSA NDA Panel, 2011, 2013a, 2013b). However, the studies provided in those applications did not establish that inhibition of the adhesion of *E. coli* demonstrated ex vivo predicted the occurrence of a clinically relevant inhibition of the adhesion of *E. coli* to uroepithelial cells in humans.

b. Antibacterial effects

The applicant provided a study on a mouse model of experimental *E. coli* UTI infection (Jensen et al., 2017). Mice assigned to consume ad libitum either commercial (sweetened) cranberry juice, fresh (unsweetened) cranberry juice, the hydrophilic fraction of cranberry juice or the combination of organic acids (quinic, malic, shikimic and citric acids) in similar concentrations as found in cranberry juice, showed lower bacterial counts in the lower urinary tract as compared to those assigned to water after 7 days of treatment, when the animals were sacrificed. The Panel notes that this study addresses the effect of cranberry juice and organic acids in cranberry products in the treatment of UTI rather than the risk of developing UTI, that the cranberry juice and the mixture of organic acids reduced bacterial counts in variable amounts depending on the product tested but did not cure infections and that Pacran® was not tested. The Panel considers that this study provides no information about a mechanism by which Pacran® could exert the claimed effect.

c. Modulation of/by the gut microbiota.

The applicant claims that, on the one hand, the gut microbiota has the capacity to metabolise cranberry compounds, particularly larger oligomer polyphenols, into low-molecular weight phenolics (e.g. phenyl-γ-valerolactone) that are subsequently found in urine and have shown AAA in vitro (Feliciano et al., 2016; Mena et al., 2017). Additionally, the microbiota can degrade and ferment cranberry fibre. On the other hand, these compounds could modulate the gut microbiota composition, as shown by the shift in Firmicutes:Bacteroidetes ratio in volunteers following whole cranberry fruits consumption (Bekiares et al., 2018; Rodríguez-Morató et al., 2018). In this context, it is speculated that cranberry products could also decrease the colonisation of the gastrointestinal tract by extraintestinal pathogenic *E. coli* as shown in an in vitro model of gut epithelial cell culture (Feliciano et al., 2014), thus decreasing the likelihood of uropathogens transferring to the urinary tract. The Panel considers that this proposed mechanism is speculative and not supported by data in vivo in animals or humans.

The Panel notes that, whereas some evidence has been provided for an effect of Pacran® on inhibiting adhesion of P-fimbriated *E. coli* to red blood cells ex vivo, an effect that is supported by AAA in vitro of some cranberry compounds and metabolites, the studies provided do not establish that inhibition of the adhesion of *E. coli* demonstrated ex vivo predicts the occurrence of a clinically relevant inhibition of the adhesion of *E. coli* to uroepithelial cells in vivo in humans. The Panel also notes that no convincing evidence has been provided for other mechanisms by which Pacran® could reduce the incidence of UTI.

Overall, the Panel considers that limited evidence has been provided for a mechanism by which Pacran® could exert the claimed effect.

Weighing of the evidence

In weighing the evidence, the Panel takes into account that one human intervention study (unpublished study A) showed a beneficial effect of Pacran® consumed daily at doses of 500 mg for 6 months on the incidence of symptomatic, culture-confirmed UTI in women with a history of recurrent UTI infections, whereas such an effect was not consistently observed in another study (Vostalova et al., 2015) under similar conditions. The Panel also takes into account that limited evidence has been provided for a mechanism by which Pacran® could exert the claimed effect.

The Panel concludes that the evidence provided is insufficient to establish a cause and effect relationship between the consumption of Pacran® and the defence against bacterial pathogens in the lower urinary tract.

4 | CONCLUSIONS

On the basis of the data presented, the Panel concludes that:

- Pacran®, a powder obtained from cranberries which is the subject of the health claim, is sufficiently characterised in relation to the claimed effect.
- The claimed effect proposed by the applicant is 'defence against bacterial pathogens in the lower urinary tract'. The proposed target population is 'adult women with a history of recurrent urinary tract infection'. The Panel considers that defence against bacterial pathogens in the lower urinary tract is a beneficial physiological effect.
- The evidence provided is insufficient to establish a cause and effect relationship between the consumption of Pacran® and the defence against bacterial pathogens in the lower urinary tract

5 | DOCUMENTATION AS PROVIDED TO EFSA

Health claim application on "Dried cranberry power contributes to the defence against bacterial pathogens in the lower urinary tract" pursuant to Article 13.5 of Regulation (EC) No 1924/2006 (Appian number: HC-2024-21772). Submitted by Givaudan.

6 | STEPS TAKEN BY EFSA

1. This application was received by EFSA on 28/5/2024. The application was validated on 6/8/2024 and the scientific evaluation started.
2. The scope of the application was proposed to fall under a health claim based on newly developed scientific evidence.
3. The Working Group on Claims of the NDA Panel agreed on a list of questions for the applicant to provide additional information to accompany the application. EFSA sent a first Additional Data Request (ADR1) letter to the Applicant on 14/10/2024. The clock was stopped on 14/10/2024. On 23 October 2024, a clarification teleconference took place between representatives of Givaudan and EFSA staff to clarify the questions raised during the ADR1. The clock restarted on 29/10/2024.
4. EFSA sent a second Additional Data Request (ADR2) letter to the Applicant on 4/12/2024. The clock was stopped on 4/12/2024. The clock restarted on 19/12/2024.
5. During its meeting on 29/01/2025, the NDA Panel, having evaluated the data, discussed the draft opinion. The opinion on the scientific substantiation of a health claim related to Pacran®, a powder obtained from cranberries, and defence against bacterial pathogens in the lower urinary tract was adopted by the NDA Panel via written procedure on 05/03/2025.

ABBREVIATIONS

AAA	anti-adhesive activity
ADR	additional data request
BL-DMAC	Brunswick Laboratory 4-dimethylaminocinnamaldehyde
BMI	body mass index
CFU	colony forming unit
CoU	condition of useFASfull analysis set
FLD	fluorescence detection
GLM	generalised linear model
HPLC	high-performance liquid chromatography
HR	hazard ratio
IRR	incidence rate ratio
ITT	intention-to-treat
LC–HRMS	liquid chromatography–high resolution mass spectrometry
NDA Panel	EFSA Panel on Dietetic Products, Nutrition and Allergies
OR	odds ratio
PACs	proanthocyanidins
PC	Public Consultation
PICO	population, intervention, comparators, outcomes
PP	per protocol
RCTs	randomised controlled trials
RR	relative risk
UTI	urinary tract infection
UV	ultraviolet

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REQUESTOR

Competent Authority of Italy following an application by Givaudan

QUESTION NUMBER

EFSA-Q-2024-00321

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REFERENCES

Bekiares, N., Krueger, C. G., Meudt, J. J., Shanmuganayagam, D., & Reed, J. D. (2018). Effect of sweetened dried cranberry consumption on urinary proteome and fecal microbiome in healthy human subjects. *OMICS*, *22*, 145–153. https://doi.org/10.1089/omi.2016.0167

Coleman, C. M., Auker, K. M., Killday, K. B., Azadi, P., Black, I., & Ferreira, D. (2019). Arabinoxyloglucan oligosaccharides may contribute to the antiadhesive properties of porcine urine after cranberry consumption. *Journal of Natural Products*, *82*, 589–605. https://doi.org/10.1021/acs.jnatprod.8b01043

Coleman, C. M., & Ferreira, D. (2020). Oligosaccharides and complex carbohydrates: A new paradigm for cranberry bioactivity. *Molecules*, *25*(4), 881. https://doi.org/10.3390/molecules25040881

de González Llano, D., Liu, H., Khoo, C., Moreno-Arribas, M. V., & Bartolomé, B. (2019). Some new findings regarding the antiadhesive activity of cranberry phenolic compounds and their microbial-derived metabolites against Uropathogenic bacteria. *Journal of Agricultural and Food Chemistry*, *67*, 2166–2174. https://doi.org/10.1021/acs.jafc.8b05625

de González Llano, D., Moreno-Arribas, M. V., & Bartolomé, B. (2020). Cranberry polyphenols and prevention against urinary tract infections: Relevant considerations. *Molecules*, *25*, 3523.

de Llano, D. G., Esteban-Fernández, A., Sánchez-Patán, F., Martínlvarez, P. J., Moreno-Arribas, M. V., & Bartolomé, B. (2015). Anti-adhesive activity of cranberry phenolic compounds and their microbial-derived metabolites against uropathogenic *Escherichia coli* in bladder epithelial cell cultures. *International Journal of Molecular Sciences*, *16*, 12119–12130. https://doi.org/10.3390/ijms160612119

EFSA (European Food Safety Authority). (2009). Scientific Opinion of the Panel on Dietetic Products,Nutrition and Allergies (NDA Panel) on a request from Ocean Spray International Services Limited(UK), related to the scientific substantiation of a health claim on Ocean Spray Cranberry Products® and reduced risk of urinary tract infection in women by inhibiting the adhesion ofcertain bacteria in the urinary tract. *EFSA Journal*, *7*(2), 943. https://doi.org/10.2903/j.efsa.2009.943

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2010). Scientific opinion on dietary reference values for carbohydrates and dietary fibre. *EFSA Journal*, *8*(3), 1462. https://doi.org/10.2903/j.efsa.2010.1462

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2011). Scientific opinion on the substantiation of health claims related to proanthocyanidins from cranberry (Vaccinium macrocarpon Aiton) fruit and defence against bacterial pathogens in the lower urinarytract (ID 1841, 2153, 2770, 3328), "powerful protectors of our gums" (ID 1365), and "heart health"(ID 2499) pursuant to article 13(1) of regulation (EC) No 1924/2006. *EFSA Journal*, *9*(6), 2215. https://doi.org/10.2903/j.efsa.2011.2215

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2013a). Scientific opinion on the substantiation of a health claim related to Monurelle® and reduction of bacterial colonisation of the urinary tract by the inhibition of the adhesion of P-fimbriated *E. coli* touroepithelial cells pursuant to article 13(5) of regulation (EC) No 1924/2006. *EFSA Journal*, *11*(2), 3082. https://doi.org/10.2903/j.efsa.2013.3082

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2013b). Scientific opinion on the substantiation of a health claim related to proanthocyanidins in Urell® and reduction of bacterial colonisation of the urinary tract by inhibition of the adhesion of P-fimbriated *E. coli* to uroepithelial cells pursuant to article 13(5) of regulation (EC) No 1924/2006. *EFSA Journal*, *11*(7), 3326. https://doi.org/10.2903/j.efsa.2013.3326

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2014). Scientific opinion on the substantiation of a health claim related to Pacran® and defence against bacterial pathogens in the lower urinary tract pursuant to article 13(5) of regulation (EC) No 1924/2006. *EFSA Journal*, *12*(5), 3656. https://doi.org/10.2903/j.efsa.2014.3656

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2016). Guidance on the scientific requirements for health claims related to the immune system, thegastrointestinal tract and defence against pathogenic microorganisms. *EFSA Journal*, *14*(1), 4369. https://doi.org/10.2903/j.efsa.2016.4369

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2021a). General scientific guidance for stakeholders on health claim applications (revision 1). *EFSA Journal*, *19*(3), 6553. https://doi.org/10.2903/j.efsa.2021.6553

EFSA NDA Panel (EFSA Panel on Nutrition, Novel Foods and Food Allergens). (2021b). Scientific and technical guidance for the preparation and presentation of a health claim application (revision 3). *EFSA Journal*, *19*(3), 6554. https://doi.org/10.2903/j.efsa.2021.6554

Feliciano, R. P., Boeres, A., Massacessi, L., Istas, G., Ventura, M. R., Dos Nunes Santos, C., Heiss, C., & Rodriguez-Mateos, A. (2016). Identification and quantification of novel cranberry-derived plasma and urinary (poly)phenols. *Archives of Biochemistry and Biophysics*, *599*, 31–41. https://doi.org/10.1016/j.abb.2016.01.014

Feliciano, R. P., Meudt, J. J., Shanmuganayagam, D., Krueger, C. G., & Reed, J. D. (2014). Ratio of "A-type" to "B-type" Proanthocyanidin Interflavan bonds affects extra-intestinal pathogenic *Escherichia coli* invasion of gut epithelial cells. *Journal of Agricultural and Food Chemistry*, *62*, 3919–3925. https://doi.org/10.1021/jf403839a

Gu, L., Kelm, M. A., Hammerstone, J. F., Beecher, G., Holden, J., Haytowitz, D., Gebhardt, S., & Prior, R. L. (2004). Concentrations of proanthocyanidins in common foods and estimations of normal consumption. *The Journal of Nutrition*, *134*, 613–617. https://doi.org/10.1093/jn/134.3.613

Gullickson, E. R., Krueger, C. G., Birmingham, A., Maranan, M., & Reed, J. D. (2020). Development of a cranberry standard for quantification of insoluble cranberry (*Vaccinium macrocarpon* Ait.) Proanthocyanidins. *Journal of Agricultural and Food Chemistry*, *68*, 2900–2905. https://doi.org/10.1021/acs.jafc.9b03696

Howell, A. B., Vorsa, N., Der Marderosian, A., & Foo, L. Y. (1998). Inhibition of the adherence of P-fimbriated *Escherichia coli* to uroepithelial-cell surfaces by proanthocyanidin extracts from cranberries. *The New England Journal of Medicine*, *339*, 1085–1086. https://doi.org/10.1056/nejm199810083391516

Jensen, H. D., Struve, C., Christensen, S. B., & Krogfelt, K. A. (2017). Cranberry juice and combinations of its organic acids are effective against experimental urinary tract infection. *Frontiers in Microbiology*, *8*, 542. https://doi.org/10.3389/fmicb.2017.00542

Konesan, J., Liu, L., & Mansfield, K. J. (2022). The clinical trial outcomes of cranberry, D-mannose and NSAIDs in the prevention or Management of Uncomplicated Urinary Tract Infections in women: A systematic review. *Pathogens*, *11*(12), 1471. https://doi.org/10.3390/pathogens11121471

Liu, H., Tayyari, F., Khoo, C., & Gu, L. (2015). A 1H NMR-based approach to investigate metabolomic differences in the plasma and urine of young women after cranberry juice or apple juice consumption. *Journal of Functional Foods*, *14*, 76–86. https://doi.org/10.1016/j.jff.2015.01.018

Manach, C., Williamson, G., Morand, C., Scalbert, A., & Rémésy, C. (2005). Bioavailability and bioefficacy of polyphenols in humans. I. Review of 97 bioavailability studies. *The American Journal of Clinical Nutrition*, *81*(1), 230–242. https://doi.org/10.1093/ajcn/81.1.230S

Mena, P., de González Llano, D., Brindani, N., Esteban-Fernández, A., Curti, C., Moreno-Arribas, M. V., Del Rio, D., & Bartolomé, B. (2017). 5-(3′,4′-Dihydroxyphenyl)-γ-valerolactone and its sulphate conjugates, representative circulating metabolites of flavan-3-ols, exhibit anti-adhesive activity against uropathogenic *Escherichia coli* in bladder epithelial cells. *Journal of Functional Foods*, *29*, 275–280. https://doi.org/10.1016/j.jff.2016.12.035

Prior, R. L., Fan, E., Ji, H., Howell, A., Nio, C., Payne, M. J., & Reed, J. (2010). Multi-laboratory validation of a standard method for quantifying proanthocyanidins in cranberry powders. *Journal of the Science of Food and Agriculture*, *90*, 1473–1478. https://doi.org/10.1002/jsfa.3966

Prior, R. L., & Gu, L. (2005). Occurrence and biological significance of proanthocyanidins in the American diet. *Phytochemistry*, *66*, 2264–2280. https://doi.org/10.1016/j.phytochem.2005.03.025

Rodríguez-Morató, J., Matthan, N. R., Liu, J., de la Torre, R., & Chen, C. O. (2018). Cranberries attenuate animal-based diet-induced changes in microbiota composition and functionality: A randomized crossover controlled feeding trial. *The Journal of Nutritional Biochemistry*, *62*, 76–86. https://doi.org/10.1016/j.jnutbio.2018.08.019

Ronald, A. (2002). The etiology of urinary tract infection: Traditional and emerging pathogens. *The American Journal of Medicine*, *113*(Suppl. 1A), 14–19. https://doi.org/10.1016/s0002-9343(02)01055-0

Sengupta, K., Alluri, K. V., Golakoti, T., Gottumukkala, G. V., Raavi, J., Kotchrlakota, L., Sigalan, S. C., Dey, D., Ghosh, S., & Chatterjee, A. (2011). A randomized, double blind, controlled, dose dependent clinical trial to evaluate the efficacy of a Proanthocyanidin standardized whole cranberry (*Vaccinium macrocarpon*) powder on infections of the urinary tract. *Current Bioactive Compounds*, *7*, 39–46. https://doi.org/10.2174/157340711795163820

Serrano, J., Puupponen-Pimiä, R., Dauer, A., Aura, A. M., & Saura-Calixto, F. (2009). Tannins: Current knowledge of food sources, intake, bioavailability and biological effects. *Molecular Nutrition & Food Research*, *53*(Suppl. 2), S310–S329. https://doi.org/10.1002/mnfr.200900039

Sun, J., Marais, J. P., Khoo, C., LaPlante, K., Vejborg, R. M., Givskov, M., Tolker-Nielsen, T., Seeram, N. P., & Rowley, D. C. (2015). Cranberry (*Vaccinium macrocarpon*) oligosaccharides decrease biofilm formation by uropathogenic *Escherichia coli*. *Journal of Functional Foods*, *17*, 235–242. https://doi.org/10.1016/j.jff.2015.05.016

Vostalova, J., Vidlar, A., Simanek, V., Galandakova, A., Kosina, P., Vacek, J., Vrbkova, J., Zimmermann, B. F., Ulrichova, J., & Student, V. (2015). Are high Proanthocyanidins key to cranberry efficacy in the prevention of recurrent urinary tract infection? *Phytotherapy Research*, *29*, 1559–1567. https://doi.org/10.1002/ptr.5427

Williams, G., Hahn, D., Stephens, J. H., Craig, J. C., & Hodson, E. M. (2023). Cranberries for preventing urinary tract infections. *Cochrane Database of Systematic Reviews*, *4*, Cd001321. https://doi.org/10.1002/14651858.CD001321.pub6

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