Efficacy under evaluation

F.J Trevor Burke and Russell J Crisp review SDI Riva resin-modified glass ionomer cement.

The importance of practice-based research has been emphasised by Mandel, who considered that "research is not only the silent partner in dental practice; it is the very scaffolding on which we build and sustain a practice". In this respect, a wide variety of research projects may be considered to be appropriate to general dental practice. These include:

- Assessment of materials and techniques.
- Clinical trials of materials.
- Assessment of treatment trends and treatment of disease.
- Assessment of behaviour and attitudes (of dentists as well as patients).
- Evaluation of disease incidence.
- Patient satisfaction.

The volume of clinical material seen in general dental practice makes dental practice an area of fundamental importance in the assessment of new techniques and materials, as success of a material, technique or instrument could be considered to be its performance in everyday use in a particular dentist's office. Central to good performance of dental materials are their physical properties and ease of use. The assessment of the handling of a new dental material is therefore of importance.

The handling of a given material or effectiveness of a device by one operator is necessarily subjective, but when practitioners band together to form a group in order to assess the handling of new materials in dental practice, the results are likely to be more objective. A well-known UK-based group of practice-based researchers is the PREP (Product Research and Evaluation by Practitioners) Panel. This group was established in 1993 with six general dental practitioners, and has grown to contain 32 dental practitioners located across the UK, with one in mainland Europe. It has completed almost 60 projects – mainly 'handling' evaluations of materials, devices and techniques, but with an increasing emphasis on scientific clinical evaluations of the effectiveness of restorations, of which seven are on-going at the time of writing.

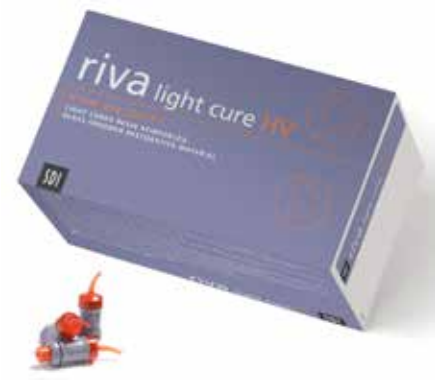

Fig 1a. Riva RMGI LC: pack presentation.

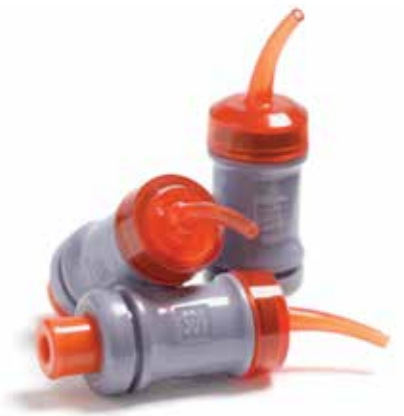

Fig 1b: Riva RMGI LC capsules.

Fig 2 Erosion/abrasion cavities buccal surface UR45: causing sensitivity.

Fig 3 Cavities in Fig 2 restored with Riva RMGI LC.

Glass ionomer materials

Glass ionomer materials have become an integral part of restorative dentistry, especially in the UK and Europe, since their introduction in 1972. Their advantages include effective bonding to tooth structure, good compressive strength and fluoride release, at least during the first week following placement, although the effect of this on cariostasis *in vivo* is not clear. However, their disadvantages include suboptimal aesthetics and poor fracture strength. These disadvantages may be overcome by the incorporation into the structure, of a resin matrix. This leads to an improvement in aesthetics, bond strength and enhanced fluoride release. The handling of these materials could be considered to have been a neglected area for research: this study aims to start to address this.

This study will therefore evaluate the in-practice handling of SDI Riva

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resin modified glass ionomer cement by the group of general dental practitioners who comprise the PREP Panel.

Materials and methods

A questionnaire was designed jointly by the PREP Panel co-ordinators and the manufacturer of Riva glass ionomer range (SDI Ltd) in order to provide background information on glass ionomer materials used previously by the participating practitioners and to compare the ease of use and handling of those with the ease of use and handling of SDI's latest resin modified glass ionomer, Riva Light Cure HV (RMGI) with the majority of responses being given on a visual analogue scale (VAS).

All 32 members of the PREP Panel were sent a letter asking if they were prepared to evaluate the ease of use and handling of a RMGI and 10 members were selected at random from those who gave a positive response. Explanatory letters, questionnaires and a pack of Riva light cured RMGI, the same as that which is presently on sale in the UK, with manufacturers' instructions for use, was distributed to the selected practitioners. The practitioners used Riva RMGI in situations where it is indicated and returned the questionnaire after 10 weeks' use of the material. The data from the returned questionnaires were then collated.

Clinical evaluation

The number of glass ionomer restorations placed by the evaluators in a typical week ranged from less than 10 (eight respondents) to 11-25 (two respondents). None placed more than 25 GI restorations per week. The evaluators used a variety of glass ionomer materials, with reasons for the choice of these materials were ease of use, good handling, and durability. Other reasons were familiarity, cost, fluoride release, good reputation, aesthetics, and speed.

When the evaluators were asked to rate the ease of use of the glass ionomer material used most frequently, the result was as follows:

a) Anterior restorations

Difficult to use — Easy to use

1  5

4.0

Comment:

"Do not use glass ionomers in anterior teeth"

b) Posterior restorations

Difficult to use — Easy to use

1  5

4.1

When the evaluators were asked to rate the ease of use of the RMGI materials, the result was:

Difficult to use — Easy to use

1  5

4.4

Two (20 per cent) evaluators stated that they placed glass ionomer restorations in load bearing positions in the posterior teeth of adults, these being used either in the caries stabilisation phase of treatment or as tooth-coloured restorations for posterior teeth where the patient was unwilling to pay the (higher) charge for a resin composite restoration.

Nine evaluators (90 per cent) stated that they placed glass ionomer restorations in load bearing positions in the posterior primary teeth.

When the evaluators were asked about the number of shades in their current glass ionomer system, the result was as follows:

Sufficient	Seven (70 per cent)
Not enough	Three (30 per cent)

Regarding the aesthetic quality of GI restorations, comments made were:

"I don't place glass ionomer restorations where aesthetics important." (two similar)

"Generally too opaque." (two similar)

"Only occasionally used in elderly patients."

Evaluation of SDI Riva Light Cure HV

Evaluators rated the presentation of the kit as follows:

Poor — Excellent

1  5

4.2

Comments:

"Easy to mix shades up – need separate compartments." (three similar)

"Box too big."

The instructions were rated by the evaluators as follows:

Poor — Excellent

1  5

4.9

The total number of restorations placed during the evaluation was 186, comprised in percentage terms as follows:

Anterior	Class V	four per cent
	Class III	three per cent
Posterior	Class V	45 per cent
	Class I/II/other	48 per cent

When the evaluators were asked to give details of the placement techniques used for Class V restorations five evaluators (50 per cent) used a matrix, and eight evaluators (80 per cent) carved freehand. Three evaluators used both techniques.

When the evaluators were asked to give their, and their dental nurses', assessment of the dispensing and placement of Riva Light Cure HV, the result was as follows:

Inconvenient — Convenient

1  5

4.1

Five (50 per cent) of the evaluators stated that they experienced difficulty with the material sticking to instruments. This was overcome by placing bond on the instrument. Three (30 per cent) of the evaluators experienced a problem with the material slumping when placing restorations freehand.

When the evaluators were asked if the material's viscosity was satisfactorily, 70 per cent stated that it was.

Nine (90 per cent) of the evaluators stated that the material had sufficient working time in the ambient light of the surgery and the same number stated that the restoration margins were visually satisfactory.

The ease of polishing of restorations of Riva Light Cure HV was rated to be as follows:

Difficult — Easy

1  5

3.9

Eight evaluators (80 per cent) stated that the number of shades was adequate and the same number stated that the number of shades was not excessive.

The overall surface finish achieved with restorations of Riva Light Cure HV was assessed as follows:

Poor Excellent
1  5
3.0

Comments:
"Did not use where aesthetics important as with other glass ionomers."
"Not as good as composite but better than any other glass ionomer."
"Smooth surface at placement and easily finished."

The principal use of Riva Light Cure HV by the evaluators was seen to be as follows:

Anterior	0 evaluators
Posterior	5 evaluators
Universal	3 evaluators
Build-ups/primary teeth	1 evaluator

Seventy per cent of the evaluators stated they were satisfied with Riva Light Cure HV, and 60 per cent stated they would both purchase the material if available at an average price and also would recommend Riva Light Cure HV to colleagues.

The evaluators rated the ease of use of Riva Light Cure HV as follows:

Difficult to use Easy to use
1  5
4.0

Comments:
"Really liked it. Needs a 'coat' and then gives a good finish."
"Slightly difficult to extrude from capsule." (Two similar)
"On extrusion first 50 per cent very thick and second 50 per cent more runny."
"Nozzle of capsule quite wide."
"Lovely material well presented."

When the evaluators were asked what changes were considered essential for the acceptability of Riva Light Cure HV the following comments were made:
"Redesign capsules to extrude more easily."
"Change viscosity."
"No changes – good consistency."

The price difference for Riva LC HV compared with the previously used glass ionomer system was expected to be:

15 per cent more	1 evaluator
5 per cent more	1 evaluator
Same	2 evaluators
25 per cent less	2 evaluators
Five per cent less	1 evaluator
No comment	3 evaluators

Comment:
"Price not important if the material is what I want."

Suggestions for improvement included:
"Improve capsules."
"Increase viscosity."
"I had a problem activating the capsules a couple of times but nurse had no problem."

Final comments:
"Very good material and easy to use."
"Liked it as a core material. Also used it with a temporary crown- big mistake as very adhesive to tooth!"
"Don't generally use glass ionomer materials but perhaps will use Riva LC for high caries rates, build ups, root caries and where wear resistance and aesthetics not important."

Discussion and conclusions
The SDI Riva Light Cure HV restorative system has been subjected to evaluation in clinical practice by members of the PREP panel in which 186 restorations were placed. Based on this the following conclusions may be made:

Presentation
The kit scored well in all the criteria rated, with scores ranging from 4.0 (where 5 = excellent and 1 = poor) for arrangement of the components, 4.1 for ability to position on the work surface and ease of cleaning, 4.2 for overall presentation, to 4.6, on the same VAS scale, for completeness of the system. The illustrated guide/instructions achieved a high rating of 4.9.

Dispensing and handling
Riva Light Cure HV scored well for dispensing and placement (4.1 on a VAS where 1 = inconvenient and 5 = convenient) and the overall score for ease of use was the same as the previously used conventional glass-ionomer system for anterior restorations (4.0 on a VAS where 1- difficult to use and 5 = easy to use) and very similar to the same score for posterior restorations (4.0 v 4.1). However this 'ease of use' score was not as good as the score for the pre-evaluation RGMI material (4.4 on the same scale). The use of glass material was not considered by three evaluators (30 per cent) for anterior teeth because of aesthetic concerns, but Riva Light Cure HV performed well in comparison with the previously used glass-ionomer material (3.1 v 1.6 on a VAS where 1= poor and 5 = excellent).

Comment was made by some evaluators on the difficulties of extruding the material from the capsules, suggesting that the material is too stiff or that the capsule diameter is too small.

The majority of the evaluators (60 per cent) stated they would both purchase the material and recommend it to colleagues.

Conclusions
The good reception of the Riva Light Cure HV glass ionomer restorative system is underlined by the number of evaluators who stated they would both purchase the material and recommend it to colleagues. Overall 50 per cent of the evaluators preferred the light-cured version of this material to the self-cured. Possibly the development of a dual-cure version of this material, with an altered viscosity, would further improve the acceptability of this product.

References available on request.