

Clinical Practice Guidelines for Carious Lesion Management 2026

The Dental Association of Thailand

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Abstract

Dental caries remains one of the most prevalent oral diseases and continues to represent a significant public health challenge in Thailand. Contemporary caries management has shifted from a predominantly restorative approach toward a comprehensive, minimally invasive, and risk-based strategy that emphasizes both disease control and preservation of tooth structure. This article presents the updated 2026 Clinical Practice Guidelines for Carious Lesion Management in Thailand, developed by the Dental Association of Thailand through a structured consensus process and comprehensive review of current scientific evidence. The guidelines utilize the International Caries Detection and Assessment System (ICDAS) and the International Caries Classification and Management System (ICCMS™) to classify lesion severity and guide clinical decision-making. Management recommendations are provided for carious lesions in both primary and permanent dentitions, encompassing occlusal, smooth, proximal, and root surfaces. The updated recommendations emphasize non-invasive and micro-invasive interventions for early lesions, risk-based preventive care, minimally invasive restorative approaches, and preservation of pulp vitality whenever feasible. Significant revisions include greater emphasis on fluoride-based preventive strategies in primary teeth, incorporation of radiographic assessment in treatment planning, expanded indications for minimally invasive restorative management of proximal lesions, recognition of both selective and non-selective carious tissue removal approaches for deep carious lesions in permanent teeth, and updated guidance for root caries management in aging populations. These guidelines aim to support evidence-based, patient-centered, and context-appropriate clinical decision-making while promoting equitable and effective caries management across diverse healthcare settings in Thailand.

Keywords: Caries management, Carious lesion, Clinical practice guidelines, Dental caries, Permanent teeth, Primary teeth

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Introduction

Dental caries remains a significant public health challenge in Thailand. Modern management has shifted from a purely restorative approach to a more holistic strategy, requiring a comprehensive management approach that operates at two distinct levels: the individual level and the lesion level.

At the individual level, the focus is on managing the disease process itself. This is achieved through a thorough Caries Risk Assessment (CRA) to identify the underlying etiological factors unique to each patient. Management strategies at this level include oral health behavioral modification, effective plaque biofilm control, diet modification, and the optimized use of fluoride, all supported by regular monitoring and reinforcement to ensure long-term oral health. In parallel, management at the lesion level involves the clinical assessment and treatment of specific carious manifestations. The primary goal at this level is early caries detection and the implementation of interventions designed to arrest or prevent the progression of initial lesions. By focusing on the lesion level, clinicians can prioritize the preservation of sound tooth structure, aligning with the principles of Minimal Intervention Dentistry (MID).

In 2017, the Dental Association of Thailand introduced guidelines emphasizing MID.¹ These approaches prioritized the preservation of natural tooth structure and the selection of restorative materials based on individual risk. For deep carious lesions, the "Selective Caries Removal to Soft Dentin" technique was advocated to avoid pulp exposure and maintain pulp vitality. However, as dental research evolves, new evidence regarding the efficacy of various techniques and materials has emerged. Specifically, the debate between selective caries removal and non-selective caries removal in permanent teeth—including long-term

outcomes and survival rates—continues to be a critical topic in clinical practice. Furthermore, there are ongoing questions regarding the necessity and effectiveness of non-invasive restoration for managing initial carious lesions in primary teeth. Consequently, there is an urgent need to review and update these guidelines to reflect current scientific evidence and the specific clinical context of Thailand.

Moreover, caries management is currently taught with considerable variation across dental schools in Thailand. Nationally endorsed, evidence-based guidelines would establish a standardized approach to caries detection, diagnosis, and management. Such guidelines would facilitate consistency in dental education, clinical calibration, and the implementation of best practices across diverse clinical settings. In response to this need, the Dental Association of Thailand initiated a national collaborative effort to develop updated guidelines for caries management.

Therefore, the objective of this article is to present the updated 2026 Clinical Practice Guidelines for Carious Lesion Management in Thailand. The target audience for these guidelines includes dentists and dental hygienists. Policy makers may also benefit from using these guidelines.

Guideline Development Process

The development of the guidelines utilized a structured consensus-building approach and a comprehensive review of contemporary dental literature. These guidelines utilize the International Caries Detection and Assessment System (ICDAS) to categorize carious lesions into stages based on clinical appearance and extent of damage, and the International Caries Classification and Management System (ICCMS) for radiographic diagnosis (Table 1).^{2,3} The methodology was divided into three primary phases:

Phase 1: Committee Establishment and Preliminary Review

A working committee of faculty members from various dental schools was established to review and update the previous guidelines¹ based on current scientific evidence and the Thai clinical context. This phase was conducted from March to May 2025.

Phase 2: Academic Seminar and Stakeholder Input

On May 22, 2025, an academic seminar was held to present the proposed guidelines. The seminar was attended by representatives from various institutions,

organizations, and dental associations, together with interested dentists, who contributed valuable feedback and professional perspectives.

Phase 3: Consensus Finalization and Distribution

Following the seminar, all input was synthesized into a final draft. A summary of the consensus was then distributed to all participating agencies to finalize the Clinical Practice Guidelines for Carious Lesion Management in Thailand.

Table 1 ICDAS Clinical Scores and ICCMS™ Radiographic Scores^{2,3}

ICDAS Clinical Scores		Clinical Description
0		Sound tooth surface (no evidence of caries)
1		First visual change in enamel (seen only after air-drying or confined to pits/fissures)
2		Distinct visual change in enamel (visible without drying; wider than natural fissure)
3		Localized enamel breakdown due to caries with no visible dentin
4		Underlying dark shadow from dentin with or without localized enamel breakdown
5		Distinct cavity with visible dentin
6		Extensive distinct cavity with visible dentin involving at least half of the surface

ICCMS™ Radiographic Scores		Radiographic Description
R0		No radiolucency visible (sound surface)
RA1		Radiolucency in the outer half of enamel
RA2		Radiolucency in the inner half of enamel, possibly reaching the enamel-dentin junction (EDJ)
RA3		Radiolucency into the outer third of dentin
RB4		Radiolucency into the middle third of dentin
RC5		Radiolucency into the inner third of dentin, possibly near the pulp
RC6		Radiolucency extends into the pulp chamber; potential pulpal involvement is evident

Guideline Consensus

These guidelines provide comprehensive management for carious lesions in both primary and permanent dentition that have not involved the pulp.

The guidelines address both active and inactive lesions across all tooth surfaces. The standardized terminology and definitions used throughout these guidelines are presented in Table 2.

Table 2 Terminology and definition

Terminology	Definitions
Routine oral care	Brushing twice daily with 1,000-1,500 ppm fluoride; daily floss; limit sugar frequency; regular dental visits according to caries risk.
Non-invasive intervention	No hard tissue removal: caries prevention/inactivation via fluoride, chemical agents (controlled mineral balance), biofilm disruption, and dietary control—personalized according to caries risk. ⁴
Micro-invasive intervention	Micrometer-level removal during etching, e.g., sealing with resin or glass ionomer sealant, or resin infiltration. ⁴ (Remark: Resin-based sealant is preferable unless the isolation is not ideal, glass ionomer sealant could be applied.)

Table 2 Terminology and definition (cont.)

Terminology	Definitions
Minimally invasive restoration	Removal of gross hard tissue using hand or rotary instruments, usually with restoration placement. ⁴
Selective carious tissue removal	Carious tissue is removed until soft or firm dentin is reached, a process also known as partial or incomplete caries removal. ⁵
Non-selective carious tissue removal	Carious tissue is removed until hard dentin is reached, a process also known as complete caries removal. ⁵
Stepwise carious tissue removal	Stepwise carious tissue removal involves initially removing carious tissue until soft dentin is reached, followed by placement of a temporary restoration. After 6-12 months, the temporary restoration and remaining carious tissue are removed until firm dentin is reached, and a permanent restoration is placed. ⁵
Cleansable lesion	Carious lesion that can be maintained plaque-free through routine oral hygiene. ⁶
Non-cleansable lesion	Carious lesion that is difficult to clean due to location or morphology ⁷ , commonly covered by thick plaque before cleaning. ³ Some lesions may be made cleansable through cavity modification techniques. ⁸
Active lesion	The enamel surface appears whitish or yellowish, opaque, and rough when gently probed. Lesions are typically found in plaque stagnation areas, such as the entrances of pits and fissures, near the gingival margin, or above/below contact points on proximal surfaces. These lesions may be covered by thick plaque before cleaning. Upon gentle probing, the dentin feels soft or leathery. ³
Inactive lesion	The enamel surface can appear whitish, brownish, or black. It feels hard and smooth with a shiny appearance when gently probed. Carious lesions on smooth surfaces are typically located away from the gingival margin and may not be covered by thick plaque before cleaning. The dentin, upon gentle probing, is also shiny and hard. ³

The guidelines are organized as follows:

1. Management of Carious Lesions in Primary Teeth

- Occlusal surfaces, pits, and fissures (Table 3)
- Smooth surfaces (labial, buccal, lingual, and proximal surfaces without contact) (Table 4)
- Proximal surfaces with interproximal contact (Table 5)

2. Management of Carious Lesions in Permanent Teeth

- Occlusal surfaces, pits, and fissures (Table 6)
- Smooth surfaces (labial, buccal, lingual, and proximal surfaces without contact) (Table 7)
- Proximal surfaces with interproximal contact (Table 8)
- Root surfaces (Table 9)

Table 3 Management of Carious Lesions on Occlusal Surfaces and Pits and Fissures in Primary Teeth

Characteristics of carious lesion					Management approach ^a
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores	Activity	Clinical® and radiographic appearance	
Initial lesion	1-2	R0, RA1-2	Inactive	Clinical: White or brown-black enamel discoloration, visible when wet or dry, with a shiny, hard, smooth surface, free of plaque and cavitation Radiographic: No radiolucency or radiolucency in the outer or inner half of enamel	Routine oral care

Table 3 Management of Carious Lesions on Occlusal Surfaces and Pits and Fissures in Primary Teeth (cont.)

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores	Activity	Clinical® and radiographic appearance	Management approach ^a
Initial lesion	1	R0, RA1-2	Active	Clinical: No carious discoloration when wet; after air drying, carious opacity appears along with plaque accumulation OR Carious discoloration confined to the pit and fissure area (whether seen wet or dry), free of cavitation Radiographic: No radiolucency or radiolucency in the outer half or inner half of the enamel	1. Reinforcing brushing with 1,450 – 1,500 ppm fluoride toothpaste ^{9,10} along with surface remineralization such as fluoride varnish <i>When caries progression cannot be controlled by method 1, consider proceeding with method 2</i>
	2	R0, RA1-2	Active	Clinical: Whitish or yellowish, opaque or dull; rough surface with plaque deposits, OR Carious discoloration extending beyond the natural fissure, free of cavitation Radiographic: No radiolucency, or radiolucency in the outer or inner half of enamel	2. Sealant - Resin-based sealant ¹¹⁻¹⁴ - Glass ionomer sealant ^{*12,15}
Moderate lesion	3	RA1-2	Inactive	Clinical: Localized enamel breakdown without visible dentin; hard surface with brown or black discoloration, plaque-free. Radiographic: Radiolucency in the outer or inner half of enamel	Routine oral care
			Active	Clinical: Localized enamel breakdown without visible dentin; soft surface with plaque deposition Radiographic: Radiolucency in the outer or inner half of enamel	- Resin-based sealant ¹¹⁻¹⁴ - Glass ionomer sealant ^{*12,15,16}
		RA3	Probably Active/ Active	Clinical: Localized enamel breakdown without visible dentin Radiographic: Radiolucency in the outer third of dentin	- Resin-based sealant ¹¹⁻¹⁴ - Glass ionomer sealant ^{*12,15,16} - Minimally invasive restoration ^{9,16} for radiolucency in dentin with high risk of enamel surface fracture
		RB4	Probably Active/ Active	Clinical: Localized enamel breakdown without visible dentin Radiographic: Radiolucency in the middle third of dentin	Minimally invasive restoration ^{9,16}
	4	RA3	Probably active/ Active	Clinical: Underlying dark dentin shadow visible through enamel, with or without enamel breakdown Radiographic: Radiolucency within the outer third of dentin	- Resin-based sealant ¹¹⁻¹⁴ - Glass ionomer sealant ^{*12,15,16} - Minimally invasive restoration ^{9,16} for widespread reflective shadows with high risk of enamel surface fracture
		RB4	Probably active/ Active	Radiographic: Radiolucency within the middle third of dentin	Minimally invasive restoration ^{9,16}

Table 3 Management of Carious Lesions on Occlusal Surfaces and Pits and Fissures in Primary Teeth (cont.)

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores	Activity	Clinical® and radiographic appearance	Management approach ^a
Extensive lesion	5	RB4-RC5	Inactive	Clinical: Distinct cavity with visible dentin involving less than half of tooth surface. Dentin is hard, brown, or black color, and plaque-free Radiographic: Radiolucency within the middle or inner third of dentin, normal furcation and periapical area	- Routine oral care - Minimally invasive restoration ^{9,16} OR ART ¹⁷⁻¹⁹ OR SMART ²⁰⁻²² when indicated for masticatory function, space maintenance, esthetics, or oral hygiene facilitation
			Active	Clinical: Distinct cavity with visible dentin involving less than half of tooth surface. Dentin is soft or leathery on gentle probing, no spontaneous pain Radiographic: Radiolucency within the middle or inner third of dentin, normal furcation and periapical area	- Minimally invasive restoration ^{9,16} - ART ^{*,17-19} - SMART ^{*,20-22} - 38% SDF ^{*,#12,23}
	6	RB4-RC5	Inactive	Clinical: Extensive distinct cavity involves at least half of a tooth surface. Dentin is hard, brown, or black color, and plaque free Radiographic: Radiolucency within the middle or inner third of dentin, normal furcation and periapical area	- Routine oral care - Minimally invasive restoration, SSC ¹⁹ OR ART ¹⁷⁻¹⁹ OR SMART ²⁰⁻²² when indicated for masticatory function, space maintenance, esthetics, or oral hygiene facilitation
			Active	Clinical: Extensive distinct cavity involves at least half of a tooth surface. Dentin is soft or leathery on gentle probing, no spontaneous pain Radiographic: Radiolucency within the middle or inner third of dentin, normal furcation and periapical area	- Minimally invasive restoration ^{9,16} - SSC ^{§,19} - ART ^{*,17-19} - SMART ^{*,20-22} - 38% SDF ^{*,#12,23}
		RC6	Active	Radiolucency into the pulp is highly likely to require pulp treatment, which is beyond the scope of these guidelines.	

^aClinical findings may be confirmed by gentle examination using a WHO/CPI/PSR probe or blunt instrument (avoid a sharp explorer).

^oTreatment priority follows numbering; bullets (-) or "OR" indicate equal options.

^{*} In cases where moisture control is difficult, such as when children are uncooperative or in field dental settings.

[#] Esthetic concern must be considered.

[§]Consider SSC for multi-surface carious tooth, high recurrent caries risk, or treatment under general anesthesia.

SSC: Stainless steel crown; ART: Atraumatic restorative treatment; SMART: Simplified and modified atraumatic restorative treatment or Silver modified atraumatic restorative treatment; SDF: Silver diamine fluoride.

Table 4 Management of Carious Lesions on Labial, Buccal, Lingual, Open Contact Proximal Surface in Primary Teeth

Characteristics of carious lesion				
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores ^b	Activity	Clinical® and radiographic ^b appearance
Initial lesion	1-2		Inactive	White or brown-black enamel discoloration, visible when wet or dry, with a shiny, hard, smooth surface, free of plaque and cavitation

Table 4 Management of Carious Lesions on Labial, Buccal, Lingual, Open Contact Proximal Surface in Primary Teeth (cont.)

Severity	Characteristics of carious lesion				Management approach ^a
	ICDAS Clinical scores	ICCMS™ Radiographic scores ^b	Activity	Clinical ^c and radiographic ^b appearance	
Initial lesion	1		Active	When wet, no discoloration is seen; after air drying, carious opacity appears. Having plaque deposition	Reinforce brushing with 1,450 – 1,500 ppm fluoride toothpaste ^{9,10} along with surface remineralization such as fluoride varnish ^{10,12,16}
	2		Active	Whitish/yellowish; opaque, dull surface, rough to probe touch, with plaque deposition	
Moderate lesion	3		Inactive	Localized enamel breakdown without visible dentin; hard surface, brown or black discoloration, plaque-free	- Routine oral care - Minimally invasive restoration ^{9,16} when indicated for esthetics, or oral hygiene facilitation
			Active	Localized enamel breakdown without visible dentin, soft surface with plaque deposition	- Reinforce brushing with 1,450 – 1,500 ppm fluoride toothpaste ^{9,10} along with surface remineralization such as fluoride varnish ^{10,12,16}
	4		Probably active / Active	Underlying dark dentin shadow visible through enamel, with or without slight enamel breakdown	- Minimally invasive restoration ^{9,16} when esthetic concern or non-cleansable lesion
Extensive lesion	5-6		Inactive	Distinct or extensive cavity with visible dentin. Dentin is hard, brown, or black color, and plaque-free	- Routine oral care - Minimally invasive restoration ^{9,16} , ART ¹⁷⁻¹⁹ or SMART ²⁰⁻²² when indicated for esthetics, or oral hygiene facilitation
			Active	Distinct or extensive cavity with visible dentin. Dentin is soft or leathery on gentle probing	- Minimally invasive restoration ^{9,16} - SSC ^{§,19} - ART ^{*,17-19} - SMART ^{*,20-22} - 38% SDF ^{*,#,12,23}

^c Clinical findings may be confirmed by gentle examination using a WHO/CPI/PSR probe or blunt instrument (avoid a sharp explorer).

^a Treatment priority follows numbering; bullets (-) or “OR” indicate equal options

^b For buccal or lingual/palatal lesions, the depth of lesion cannot be assessed from radiographs. Therefore, the depth of caries relies on clinical appearance of caries, symptoms, and operator’s experience.

^{*} In cases where moisture control is difficult, such as when children are uncooperative or in field dental settings.

[#] Esthetic concern must be considered.

[§] Consider SSC for multi-surface carious tooth, high recurrent caries risk, or treatment under general anesthesia.

SSC: Stainless steel crown; ART: Atraumatic restorative treatment; SMART: Simplified and modified atraumatic restorative treatment or Silver modified atraumatic restorative treatment; SDF: Silver diamine fluoride.

Table 5 Management of Carious Lesions on Proximal Surface (with contact) in Primary Teeth

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores ^c	Activity	Clinical® and radiographic appearance	Management approach ^a
Initial lesion		RA1	Active	Clinical: Occlusal view sound; proximal surface (after separation) shows rough or smooth, white/yellowish, opaque, dull surface, with plaque deposits Radiographic: Radiolucency in the outer half of the enamel	- Reinforce brushing with 1,450 – 1,500 ppm fluoride toothpaste and clean proximal areas, along with surface remineralization such as fluoride varnish ^{10,12,24}
		RA2	Active	Clinical: Occlusal view sound or marginal ridge discoloration; proximal surface (after separation) shows rough or smooth, white/yellowish, opaque, dull surface, with plaque deposits Radiographic: Radiolucency in the inner half of enamel	
		RA3	Active	Clinical: Occlusal view appears sound or marginal ridge discoloration. If tooth is separated, proximal surface reveals white, yellowish, opaque, dull surface, with rough or smooth texture or small cavitation and plaque presence Radiographic: Radiolucency limited to the outer third of dentin	- Reinforce brushing with 1,450 – 1,500 ppm fluoride toothpaste and clean proximal areas, along with surface remineralization such as fluoride varnish ^{10,12,24} - Minimally invasive restoration ^{9,16} for cases with active carious lesions on other teeth or surfaces, high caries risk, limited ability to attend regular follow-up visits or when cavitated lesion is clinically detected
Moderate lesion		RB4	Active	Clinical: Marginal ridge shows discoloration or distinct cavity Radiographic: Radiolucency in the middle third of dentin	- Minimally invasive restoration ^{9,16} - SSC ^{5,19} - ART ^{*,17-19} - SMART ^{*,20-22} - 38% SDF ^{*,#12,23}
Extensive lesion		RC5	Active	Clinical: Marginal ridge breakdown or distinct cavity, no spontaneous pain Radiographic: Radiolucency in the inner third of dentin, normal furcation and periapical area	
		RC6	Active	Radiolucency into the pulp is highly likely to require pulp treatment, which is beyond the scope of these guidelines.	

[®]Clinical findings may be confirmed by gentle examination using a WHO/CPI/PSR probe or blunt instrument (avoid a sharp explorer).

[°]Treatment priority follows numbering; bullets (-) or “OR” indicate equal options.

^cFor proximal lesions, lesion depth is primarily assessed and classified using radiographs.

^{*}In cases where moisture control is difficult, such as when children are uncooperative or in field dental settings.

[#] Esthetic concern must be considered.

⁵Consider SSC for multi-surface carious tooth, high recurrent caries risk, or treatment under general anesthesia.

SSC: Stainless steel crown; ART: Atraumatic restorative treatment; SMART: Simplified and modified atraumatic restorative treatment or Silver modified atraumatic restorative treatment; SDF: Silver diamine fluoride.

Table 6 Management of Carious Lesions on Occlusal Surfaces and Pits and Fissures in Permanent Teeth

Severity	Characteristics of carious lesion				Management approach ^a
	ICDAS Clinical scores	ICCMS™ Radiographic scores	Activity	Clinical® and radiographic appearance	
Initial lesion	1-2	R0, RA1-2	Inactive	Clinical: White or brown-black enamel discoloration, visible when wet or dry, with a shiny, hard, smooth surface, free of plaque and cavitation Radiographic: No radiolucency or radiolucency in the outer or inner half of enamel	Routine oral care with monitoring ^{4,7,25-28}
	1	R0, RA1-2	Active	Clinical: No carious discoloration when wet; after air drying, carious opacity appears along with plaque accumulation OR Carious discoloration confined to the pit and fissure area (whether seen wet or dry), free of cavitation Radiographic: No radiolucency or radiolucency in the outer half or inner half of the enamel	- <i>Potentially cleansable lesion with motivation:</i> Non-invasive, risk-based intervention with monitoring ^{8,16} - <i>Non-cleansable lesion:</i> Sealant with or without fluoride varnish; requires monitoring ^{12,25,29}
	2	R0, RA1-2	Active	Clinical: Whitish or yellowish, opaque or dull; rough surface with plaque deposits, OR Carious discoloration extending beyond the natural fissure, free of cavitation Radiographic: No radiolucency, or radiolucency in the outer or inner half of enamel	
Moderate lesion	3	RA1-2	Inactive	Clinical: Localized enamel breakdown without visible dentin; hard surface, brown or black discoloration, and plaque-free Radiographic: Radiolucency in the outer or inner half of enamel	- Routine oral care ^{4,7,25-28} OR Non-invasive intervention with monitoring ³⁰ - (Optional) Sealant with monitoring OR minimally invasive restoration for questionable lesions or functional/esthetic concerns ^{4,26}
			Active	Clinical: Localized enamel breakdown without visible dentin; soft surface with plaque deposits Radiographic: Radiolucency in the outer or inner half of enamel	- <i>Potentially cleansable lesion with motivation:</i> Non-invasive, risk-based intervention with monitoring ^{8,16,31} - (Optional) Minimally invasive restoration for functional/esthetic concerns ^{4,26} - <i>Non-cleansable lesion:</i> Sealant with monitoring OR Minimally invasive restoration ^{4,16,26,27,31,32}
		RA3-RB4	Active	Clinical: Localized enamel breakdown with radiographic extension deep into the dentin Radiographic: Radiolucency within the outer or middle third of dentin	Minimally invasive restoration ^{4,6,16,26} : consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33}

Table 6 Management of Carious Lesions on Occlusal Surfaces and Pits and Fissures in Permanent Teeth (cont.)

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores	Activity	Clinical® and radiographic appearance	Management approach ^a
Moderate lesion	4	RA3-RB4	Active	Clinical: Underlying dark dentin shadow visible through enamel, with or without slight enamel breakdown Radiographic: Radiolucency within the middle third of dentin	Minimally invasive restoration ^{4,6,16,26} : consider selective removal to firm dentin or non-selective caries removal, with a well-sealed restoration ^{5,33}
		RC5	Active	Clinical: Underlying dark dentin shadow visible through enamel, with or without slight enamel breakdown; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests Radiographic: Radiolucency in the inner third of dentin (Deep caries ³⁴); normal periapical area	Minimally invasive restoration ^{4,6,16,26} : consider selective or non-selective caries removal ^{5,33,35-37} - Selective caries removal: optional base material: RMGIC or CSC with a well-sealed restoration ^{5,33-40} - Non-selective caries removal: CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration ^{5,33,35-39,41-43}
		RC6	Active	Radiolucency into the pulp (Extremely deep caries ³⁴) is highly likely to require pulp treatment, which is beyond the scope of these guidelines.	
Extensive lesion	5-6	RB4	Inactive	Clinical: Distinct or extensive distinct cavities with visible dentin, hard, brown, or black color, and plaque-free Radiographic: Radiolucency within the middle third of dentin	1. Routine oral care ^{4,7,25-28} OR Non-invasive intervention with monitoring ³⁰ 2. If restoration is needed, consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33}
			Active	Clinical: Distinct or extensive distinct cavities with visible dentin; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests Radiographic: Radiolucency within the middle third of dentin	Minimally invasive restoration ^{4,6,16,26} : consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33}
		RC5	Inactive	Clinical: Distinct or extensive distinct cavities with visible dentin, hard, brown, or black color, and plaque-free Radiographic: Radiolucency in the inner third of dentin (Deep caries ³⁴); normal periapical area	1. Routine oral care ^{4,7,25-28} OR Non-invasive intervention with monitoring ³⁰ 2. If restoration is needed, consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33,35-37} - Selective caries removal: optional base material: RMGIC or CSC with a well-sealed restoration ^{5,33-40} - Non-selective caries removal: CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration ^{5,33,35-39,41-43}

Table 6 Management of Carious Lesions on Occlusal Surfaces and Pits and Fissures in Permanent Teeth (cont.)

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores	Activity	Clinical® and radiographic appearance	Management approach ^a
			Active	Clinical: Distinct or extensive distinct cavities with visible dentin; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests Radiographic: Radiolucency in the inner third of dentin (Deep caries ³⁴); normal periapical area	Minimally invasive restoration ^{4,6,16,26} : consider selective or non-selective caries removal ^{15,33,35-37} - Selective caries removal: optional base material: RMGIC or CSC with a well-sealed restoration ^{5,33-40} - Non-selective caries removal: CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration ^{5,33,35-39,41-43}
		RC6	Active	Radiolucency into the pulp (Extremely deep caries ³⁴) is highly likely to require pulp treatment, which is beyond the scope of these guidelines.	

[®] Clinical findings may be confirmed by gentle examination using a WHO/CPI/PSR probe or blunt instrument (avoid a sharp explorer).

[°]Treatment priority follows numbering; bullets (-) or "OR" indicate equal options.

Consider 38% SDF for cavitated lesions with dentin exposure when restoration is not feasible.²⁵

CSC: calcium silicate cement; RMGIC: resin-modified glass ionomer cement

Table 7 Management of Carious Lesions on Labial, Buccal, Lingual, Open Contact Proximal Surface in Permanent Teeth

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores ^b	Activity	Clinical® and radiographic ^b appearance	Management approach ^a
Initial lesion	1-2		Inactive	White or brown-black enamel discoloration, visible when wet or dry, with a shiny, hard, smooth surface, free of plaque and cavitation	Routine oral care with monitoring ^{4,7,25-28}
			Active	Whitish or yellowish, opaque or dull, with a rough surface and plaque deposits, free of cavitation	Non-invasive, risk-based intervention with monitoring ^{8,12,16,29}
Moderate lesion	3		Inactive	Localized enamel breakdown without visible dentin; hard surface, brown or black discoloration, and plaque-free	Routine oral care ^{4,7,25-28} OR Non-invasive, risk-based intervention with monitoring ³⁰ - (Optional) Minimally invasive restoration for functional/esthetic concerns ^{4,26}
			Active	Localized enamel breakdown without visible dentin; soft surface with plaque deposits	- <i>Potentially cleansable lesion with motivation:</i> Non-invasive, risk-based intervention with monitoring ^{8,16} - (Optional) Minimally invasive restoration for functional/esthetic concerns ^{4,26}

Table 7 Management of Carious Lesions on Labial, Buccal, Lingual, Open Contact Proximal Surface in Permanent Teeth (cont.)

Characteristics of carious lesion					Management approach ^a
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores ^b	Activity	Clinical [®] and radiographic ^b appearance	
					- Potentially cleansable lesion after <i>transformation</i> (enamel reshaping); followed by surface remineralization such as fluoride varnish with monitoring^{8,16,44} - Non-cleansable lesion: Micro-invasive intervention with monitoring OR Minimally invasive restoration^{4,16,26,27,32}
	4		Active	Underlying dark dentin shadow visible through enamel, with or without slight enamel breakdown; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests	Minimally invasive restoration ^{4,6,16,26} : consider selective or non-selective caries removal ^{5,33,35-37}
Extensive lesion	5-6		Inactive	Distinct or extensive distinct cavities with visible dentin, hard, brown, or black color, and plaque-free; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests; normal periapical area	1. Routine oral care^{4,7,25-28} OR Non-invasive intervention with monitoring³⁰ 2. If restoration is needed, consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration^{5,33,35-37} - <i>Selective caries removal</i>: optional base material: RMGIC or CSC with a well-sealed restoration^{5,33-40} - <i>Non-selective caries removal</i>: CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration^{5,33,35-39,41-43}
			Active	Distinct or extensive distinct cavities with visible dentin; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests; normal periapical area	Minimally invasive restoration^{4,6,16,26}: consider selective or non-selective caries removal^{5,33,35-37} - <i>Selective caries removal</i>: optional base material: RMGIC or CSC with a well-sealed restoration^{5,33-40} - <i>Non-selective caries removal</i>: CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration^{5,33,35-39,41-43}

[®] Clinical findings may be confirmed by gentle examination using a WHO/CPI/PSR probe or blunt instrument (avoid a sharp explorer).

^a Treatment priority follows numbering; bullets (-) or "OR" indicate equal options

^b For buccal or lingual/palatal lesions, the depth of lesion cannot be assessed from radiographs. Therefore, the depth of caries relies on clinical appearance of caries, symptoms, and operator's experience. For moderate/advanced proximal lesions with no adjacent teeth, the depth of caries should be assessed with radiograph. The management should be the same as proximal lesion with contact.

Consider 38% SDF for cavitated lesions with dentin exposure when restoration is not feasible.²⁵

CSC: Calcium silicate cement; RMGIC: Resin-modified glass ionomer cement

Table 8 Management of Carious Lesions on Proximal Surface (with contact) in Permanent Teeth

Characteristics of carious lesion					
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores ^c	Activity	Clinical® and radiographic appearance	Management approach ^a
Initial lesion		RA1-2	Inactive	Clinical: Occlusal view sound; proximal surface shows non-cavitated (after separation [§]) or localized enamel breakdown without visible dentin; shiny, hard, brown/black surface, and plaque-free Radiographic: Radiolucency in the outer or inner half of enamel	Routine oral care with monitoring ^{45,46}
			Active	Clinical: Occlusal view sound or marginal ridge discoloration; proximal surface shows non-cavitated (after separation [§]) or localized enamel breakdown without visible dentin; rough or soft, white/yellowish; opaque, dull surface, with plaque deposits Radiographic: Radiolucency in the outer or inner half of enamel	- <i>Non-cavitated lesions:</i> Non-invasive, risk-based intervention with monitoring ^{12,25,29} OR Micro-invasive intervention with or without fluoride varnish; required monitoring ^{12,29,45} - <i>Cavitated lesions:</i> Minimally invasive restoration ⁴⁵⁻⁴⁷ : consider selective removal to firm dentin or non-selective caries removal with a wellsealed restoration ^{5,33}
		RA3	Probably active	Clinical: Occlusal view sound or marginal ridge discoloration; proximal surface shows non-cavitated (after separation [§]); likely seen around proximal areas with plaque deposits Radiographic: Radiolucency within the outer third of dentin	Non-invasive, risk-based intervention with monitoring ^{12,25,29} OR Micro-invasive intervention with or without fluoride varnish; required monitoring OR Minimally invasive restoration ^{29,45-48} ; depends on the lesion depth
				Clinical: Localized enamel breakdown may be visible from the occlusal, buccal, or lingual side; commonly seen in proximal areas with plaque deposits Radiographic: Radiolucency within the outer third of dentin	Minimally invasive restoration ⁴⁵⁻⁴⁷ : consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33,44-46}
			Inactive	Clinical: Distinct cavity with visible dentin, hard, brown, or black color, and plaque-free Radiographic: Radiolucency within the middle third of dentin	1. Routine oral care ^{4,7,25-28} OR Non-invasive intervention with monitoring ³⁰ 2. If restoration is needed, consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33}
				Clinical: Marginal ridge shows discoloration or distinct cavity with visible dentin; commonly seen in proximal areas with plaque deposits Radiographic: Radiolucency within the middle third of dentin	Minimally invasive restoration ⁴⁵⁻⁴⁷ : consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33}
Moderate lesion		RB4			

Table 8 Management of Carious Lesions on Proximal Surface (with contact) in Permanent Teeth (cont.)

Characteristics of carious lesion					Management approach ^a
Severity	ICDAS Clinical scores	ICCMS™ Radiographic scores ^c	Activity	Clinical® and radiographic appearance	
Extensive lesion		RC5	Inactive	Clinical: Distinct or extensive distinct cavities with visible dentin, hard, brown, or black color, and plaque-free; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests Radiographic: Radiolucency in the inner third of dentin (Deep caries ³⁴); normal periapical area	1. Routine oral care ^{4,7,25-28} OR Non-invasive intervention with monitoring ³⁰ 2. If restoration is needed, consider selective removal to firm dentin or non-selective caries removal with a well-sealed restoration ^{5,33,35-37} - <i>Selective caries removal:</i> optional base material: RMGIC or CSC with a well-sealed restoration ^{5,33-40} - <i>Non-selective caries removal:</i> CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration ^{5,33,35-39,41-43}
			Active	Clinical: Marginal ridge shows discoloration or distinct/extensive distinct cavity with visible dentin; commonly seen in proximal areas with plaque deposits; no spontaneous pain; no response to percussion; positive response to electrical/cold sensibility tests; normal periapical area	Minimally invasive restoration ^{4,6,16,26} : consider selective or non-selective caries removal ^{5,33,35-37} - <i>Selective caries removal:</i> optional base material: RMGIC or CSC with a well-sealed restoration ^{5,33-40} - <i>Non-selective caries removal:</i> CSC is preferable when in close proximity to the pulp or pulp exposure, followed by a well-sealed restoration ^{5,33,35-39,41-43}
			RC6	RC6 is very likely to involve pulp treatment, which is beyond the scope of these guidelines.	

[®] Clinical findings may be confirmed by gentle examination using a WHO/CPI/PSR probe or blunt instrument (avoid a sharp explorer).

^a Treatment priority follows numbering; bullets (-) or "OR" indicate equal options.

^c For proximal lesions, lesion depth is primarily assessed and classified using radiographs.

⁵ Tooth separation with orthodontic separator for evaluating surface integrity and lesion activity may be required.⁴⁹

Consider 38% SDF for cavitated lesions with dentin exposure when restoration is not feasible.²⁵

CSC: Calcium silicate cement; RMGIC: Resin-modified glass ionomer cement

Table 9 Management of Carious Lesions on Root surface in Permanent Teeth

Characteristics of Dental Caries				Management approach ^a
Surface texture	ICDAS Clinical scores	Activity	Caries risk	
Smooth or irregularities from non-carious cervical lesion (NCCL)	0	None	Low	Routine oral care+ and reassessment every 6 months ⁵⁰
			Moderate to high	1. Routine oral care preferably with prescribed 5000 ppm fluoridated toothpaste* ⁵¹ 2. Professionally used: 5% NaF varnish every 6 months with routine oral care ¹²

Table 9 Management of Carious Lesions on Root surface in Permanent Teeth (cont.)

Characteristics of Dental Caries				Management approach ^a
Surface texture	ICDAS Clinical scores	Activity	Caries risk	
Concavity/Initial lesion (< 0.5 mm)	1	Inactive	Low	Routine oral care and reassessment every 6 months ⁵⁰
			Moderate to high	1. Routine oral care with preferably prescribed 5000 ppm fluoridated toothpaste ⁵¹ 2. Professionally used: 5% NaF varnish every 3-4 months with routine oral care ^{12,52} OR Professionally used: 38% SDF [#] solution annually with routine oral care ^{53,54}
		Active	Low	1. Routine oral care with prescribed 5000 ppm fluoridated toothpaste ⁵¹ 2. Professionally used: 5% NaF varnish every 3-4 months with routine oral care ^{12,52} OR Professionally used: 38% SDF [#] solution annually with routine oral care ⁵³
			Moderate to high	1. Routine oral care with prescribed 5000 ppm fluoridated toothpaste ⁵¹ 2. Professionally used: 5% NaF varnish every 3-4 months with routine oral care ^{12,52} OR Professionally used: 38% SDF [#] solution annually with routine oral care ⁵³⁻⁵⁵
Cavitation/moderate to extensive lesion (> 0.5 mm)	2	Inactive	Low	1. Minimally invasive restoration is indicated only for esthetic reason ⁵⁴ in combination with routine oral care and reassessment every 6 months ^{52,57,58} 2. Additional professional application of 38% SDF [#] solution annually may be considered when restorative treatment is not feasible. For non-cleansable lesions, recontouring or restoration may be required to facilitate plaque control ^{153,54,56}
			Moderate to high	1. Minimally invasive restoration in combination with routine oral care and reassessment every 6 months ^{52,57} 2. Additional professional application of 38% SDF [#] solution annually may be considered when restorative treatment is not feasible. For non-cleansable lesions, recontouring or restoration may be required to facilitate plaque control ^{153,54,56}
		Active	Moderate to high	1. Minimally invasive restoration in combination with 5% NaF varnish every 3-4 months with routine oral care ^{12,52,58} 2. Additional professional application of 38% SDF [#] solution annually may be considered when restorative treatment is not feasible. For non-cleansable lesions, recontouring or restoration may be required to facilitate plaque control ^{153,54,56}

^a Treatment priority follows numbering; bullets (-) or "OR" indicate equal options

⁺ Routine oral care with 1,450-1,500 ppm fluoride toothpaste

[#] Esthetic concern must be considered.

Discussion

The 2026 Clinical Practice Guidelines for Carious Lesion Management in Thailand adopt the International Caries Detection and Assessment System (ICDAS) for caries classification.^{2,3} While the management approaches are grounded in international evidence, they have been

carefully adapted to reflect the Thai population context. Notably, several management recommendations for both primary and permanent teeth have been updated from the 2017 Thai Clinical Practice Guidelines¹ to better align with current evidence and local needs.

As part of the ICDAS system, these guidelines reaffirm the recommendation to use WHO/CPI/PSR probe for lesion assessment.² However, because these probes are not routinely available in many clinical settings, the use of a blunt instrument with gentle pressure, rather than a sharp explorer, is considered an acceptable alternative for caries detection.⁵⁹ This recommendation is based on evidence that probing with a sharp explorer may irreversibly damage demineralized non-cavitated enamel, potentially converting a reversible lesion into a cavitated lesion that can no longer be remineralized.⁶⁰ In contrast, blunt instruments are associated with substantially less surface damage and are more consistent with the principles of MID.⁵⁹ By explicitly restating this recommendation, the guidelines aim to encourage more consistent adoption of atraumatic caries examination techniques and support minimally invasive management in clinical practice.

The management of carious lesions in primary teeth has been substantially revised in four key areas. First, for initial occlusal carious lesions, the updated guidelines place greater emphasis on arresting lesion progression through toothbrushing with 1,450–1,500 ppm fluoride toothpaste, rather than relying primarily on fissure sealants. The evidence supporting the effectiveness of fissure sealants in primary teeth remains inconclusive.¹¹⁻¹⁵ Moreover, occlusal caries in primary teeth commonly develops at a young age when fissures are deep and children are often uncooperative during dental treatment, leading to a high risk of sealant failure and potentially negative dental experiences. Therefore, actively encouraging toothbrushing with fluoride toothpaste on the affected area is considered a more appropriate and practical approach than sealant placement, with the additional benefit of protecting adjacent teeth. Second, for moderate occlusal carious lesions (ICDAS 3 and 4), the previous guidelines primarily recommended fissure sealants. The updated guidelines now recommend incorporating radiographic assessment into clinical decision-making. If the lesion has progressed into dentin or poses a significant risk of enamel fracture, minimally invasive restoration should be considered over sealant placement. Third, for proximal carious lesions at the RA3 level, the likelihood of cavitation

has been reported to range from 14% to 61%, depending on the caries risk level of the patient.⁶¹⁻⁶⁶ The previous guidelines primarily recommended surface remineralization and closed monitoring in the absence of clinically detectable cavitation.¹ However, detecting cavitation in closed proximal contacts is inherently challenging. Given the high prevalence of dental caries among Thai children, the updated guidelines now include minimally invasive restoration as a management option for proximal carious lesions. This approach is particularly recommended when the patient presents with a very high caries risk, multiple proximal carious lesions of moderate/extensive depth, or when follow-up to monitor lesion progression cannot be assured. Fourth, the updated guidelines introduce a more flexible and comprehensive range of management options for extensive carious lesions. Recognizing the diversity of clinical environments and patient needs across Thailand, dentists are encouraged to tailor their approach according to their work setting, whether clinical, outreach, or school-based, and the individual patient's level of cooperation. This patient-centered and context-sensitive framework aims to promote inclusive and equitable carious lesion management across all care settings.

Management strategies for lesions in the permanent dentition have also been significantly revised, particularly for deep carious lesions. First, for ICDAS 5 cavitated dentin lesions with radiolucency extending to the inner third of dentin (RC5) in the absence of clear signs of pulpal involvement, the updated guidelines recommend a broader and more adaptable spectrum of therapeutic approaches.³ Treatment at this stage typically involves caries removal followed by restoration with resin composite or glass ionomer cement, with the primary aim of achieving a well-sealed restoration to limit bacterial penetration.^{8,16,30,33} When conventional restorative care is not feasible — such as in cases of limited patient cooperation or restricted access to care — silver diamine fluoride (SDF) is recommended as a practical option to arrest disease progression, particularly in outreach and school-based settings where restorative infrastructure may be limited.^{20,23,28,32} Second, the selection of a caries removal strategy is recognized

as a critical determinant of treatment outcome. Selective caries removal preserves soft or firm dentin near the pulp, thereby reducing the risk of pulp exposure and unnecessary loss of tooth structure, although it requires closer monitoring and appropriate follow-up.¹⁶ In contrast, non-selective (complete) removal eliminates all infected and demineralized tissue, offering enhanced procedural predictability and restoration sealing, but at a higher risk of pulp exposure and greater sacrifice of tooth structure.^{16,34}

Whereas the previous Thai guidelines primarily advocated selective caries removal for deep lesions,¹ the updated recommendations recognize that both selective and non-selective approaches may be appropriate depending on the clinical context. This change reflects the ongoing debate among professional organizations, as evidenced by differences in contemporary clinical practice guidelines.^{16,34,36,41,67-73} The most recent umbrella review by Aldakhil *et al.* concluded that no caries removal technique was consistently superior across all clinically relevant outcomes.⁷⁴ The overall certainty of the evidence was low to very low, with only two of the seven included systematic reviews rated as having moderate methodological quality. Although selective caries removal reduced the risk of pulp exposure, it did not consistently improve pulpal outcomes or prevent pulpal complications. In contrast, non-selective caries removal and stepwise excavation tended to demonstrate higher restorative success, while no significant differences were observed in dentine remineralization, tertiary dentine formation, or microbial reduction. Given the absence of high-certainty evidence demonstrating the long-term superiority of either approach, the choice of caries removal strategy should be individualized according to patient values and preferences, following an informed discussion of the risks and benefits, available resources (including calcium silicate cements and optical magnification), procedural invasiveness, treatment cost, local feasibility, and operator expertise. Within this framework, both selective and non-selective caries removal are considered biologically acceptable when appropriately adapted to the individual clinical situation.^{4,33,34,36-44,68} Given the limited long-term evidence currently available, however, these recommendations should be interpreted

with appropriate caution, and future guidelines may further refine preferred caries removal strategies as high-quality longitudinal data continue to emerge.

The rapidly ageing population, especially in Thailand, is expected to drive a corresponding rise in root caries prevalence, fueled by increased tooth retention, xerostomia secondary to polypharmacy, and diminished manual dexterity for oral hygiene maintenance. These factors collectively elevate caries risk and fundamentally shape management decisions.¹ The 9th National Oral Health Survey reported a high prevalence of untreated root caries and a low number of remaining teeth among older adults,⁷⁵ affecting their oral health-related quality of life. These findings indicate that primary prevention remains the most cost-effective strategy for caries management. In response, the management of root caries has evolved toward a risk-stratified, minimally invasive paradigm, as reflected in current evidence-based guidelines that integrate lesion activity, surface texture, and individual caries risk to guide clinical decision-making. Fluoride releasing agents, particularly 5% NaF varnish and 38% SDF solution, have emerged as cornerstone interventions,^{12,52,53,54} offering practical non-operative options that are especially valuable in the Thai geriatric and special care population where restorative feasibility is often limited by systemic conditions, polypharmacy-induced xerostomia, and access barriers.

With lesion progression to cavitation, minimally invasive restoration, particularly using mineral releasing-based materials, becomes the primary indicated approach, with fluoride releasing agents serving as adjuncts or alternatives when operative care is not feasible.^{53,54,56} Importantly, non-cleansable cavities necessitate recontouring or restoration to enable adequate plaque control, reinforcing the imperative for clinicians to integrate both preventive and restorative strategies within a patient-centered, special care dentistry framework.^{53-55,57} Rather than viewing these approaches as mutually exclusive, the proposed guidelines position them as complementary, with clinical decisions guided by lesion severity, patient capacity, and care setting. Ultimately, a commitment to evidence-informed practice will be

essential in ensuring that management strategies remain both clinically effective and contextually appropriate.

Conclusion

The 2026 Clinical Practice Guidelines for Carious Lesion Management provide an evidence-based framework for the diagnosis and management of carious lesions in primary and permanent dentitions. The updated recommendations reflect current scientific evidence and emphasize a minimally invasive, risk-based, and patient-centered approach that prioritizes disease prevention, preservation of tooth structure, and maintenance of pulp vitality. Key updates include enhanced use of fluoride-based preventive strategies, greater integration of radiographic findings into treatment planning, expanded management options for proximal and extensive lesions in primary teeth, recognition of both selective and non-selective carious tissue removal approaches for deep carious lesions in permanent teeth, and comprehensive guidance for root caries management in older adults.

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