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From Tea Leaves to Skincare: New Perspectives on Anti-Aging Research with Assam Tea Extract

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The paper titled "Recent insights into catechins-rich Assam tea extract for photoaging and senescent ageing" was published on January 26, 2024, in the open-access journal Scientific Reports, under the Nature Publishing Group. The authors, Mayuree Kanlayavattanakul, Mattaka Khongkow, Wannita Klinngam, Puxvadee Chaikul, Nattaya Lourith, and Piyaporn Chueamchaitrakun, are from Mae Fah Luang University and the National Nanotechnology Center (NANOTEC) in Thailand. This study systematically evaluated the antioxidant, anti-photoaging, and anti-aging activities of Assam tea extract (ATE) through in vitro and ex vivo experiments, confirming ATE's potential as a novel anti-aging product. The research showed that ATE not only exhibits excellent antioxidant activity but also significantly reduces UV-induced inflammation and matrix metalloproteinase (MMP) activity. These findings suggest that ATE can be applied as an innovative anti-aging agent in cosmetics and health promotion products.

1 Interpretation of Experimental Data

The study systematically evaluated the antioxidant, anti-photoaging, and anti-aging activities of Assam tea extract (ATE) through a series of in vitro and ex vivo experiments. Using HPLC analysis and various antioxidant assays (ABTS, DPPH, and FRAP), the study determined the content of the main active components in ATE and assessed its antioxidant capacity. Additionally, the chemical stability of ATE under different storage conditions was evaluated.

Figure 1A shows Assam tea leaves and their processed powder and extract, with the extract appearing light brown. Figure 1B lists the main catechins and caffeine detected in the study, quantified using a standardized HPLC method. The results indicate that epigallocatechin gallate (EGCG) is the predominant catechin in the extract ($p < 0.001$), while gallocatechin gallate (GCG) is the least abundant (Figure 1C). Additionally, a high level of caffeine was detected in the extract (10.90 ± 0.36 g/100 g extract). These results demonstrate that Assam tea extract is rich in various health-beneficial catechins, particularly EGCG, which has significant health-promoting potential.

Figure 4 demonstrates the safety of Assam tea extract (ATE) in a human ex vivo skin model and its effects on the expression of IL-6, MMP-1, hyaluronic acid, and PIP. Figure 4A indicates that ATE is non-cytotoxic to the skin at concentrations ranging from 0.1 to 2 mg/mL. Figure 4B shows that ATE significantly inhibits the expression of IL-6 and MMP-1 in senescent cells, with effects comparable to or stronger than EGCG ($p<0.05$). Figure 4C indicates that ATE significantly promotes the production of hyaluronic acid but is less effective than EGCG in promoting PIP expression. These results suggest that ATE can effectively inhibit inflammation and collagen degradation while promoting the production of skin moisturizing components at non-cytotoxic concentrations, indicating its good anti-aging potential.

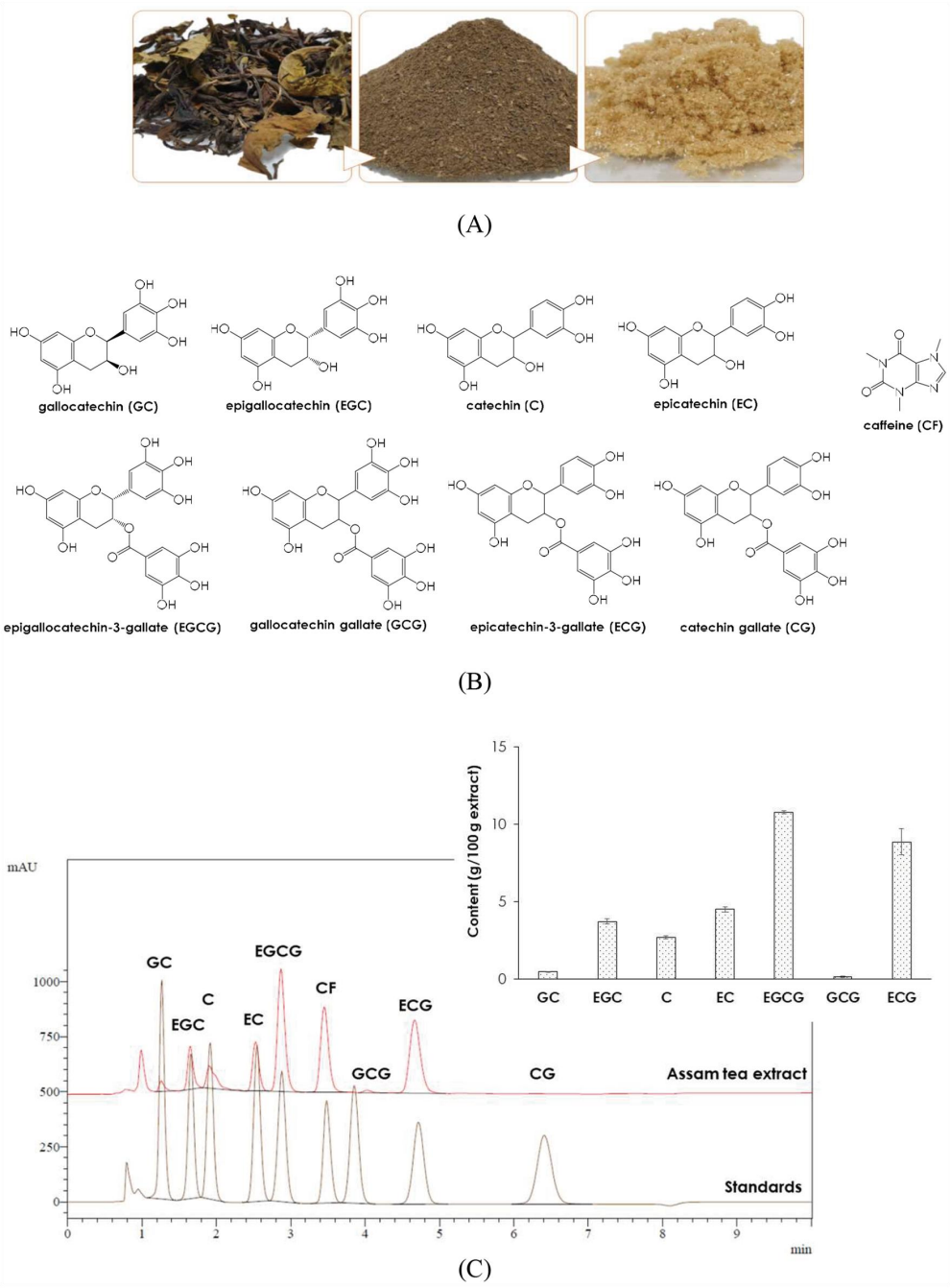

Figure 1 Assam tea leaves, powder and extract (A), the studying catechins and cafeine (B) and catechins profles of the extract (C)

Figure 5 presents the stability of Assam tea extract (ATE) after six months of storage under different conditions. The results indicate that the color difference (ΔE) of ATE at different temperatures (4°C, room temperature, and 45°C) did not exceed the visually detectable range, demonstrating its physicochemical stability (Figure 5A). HPLC analysis showed that although the catechin content decreased after six months, the relative change did not exceed 20%, remaining within the stability range for cosmetics (Figure 5B). These results suggest that ATE has good chemical stability under recommended storage conditions, making it suitable for use in actual cosmetic and health products.

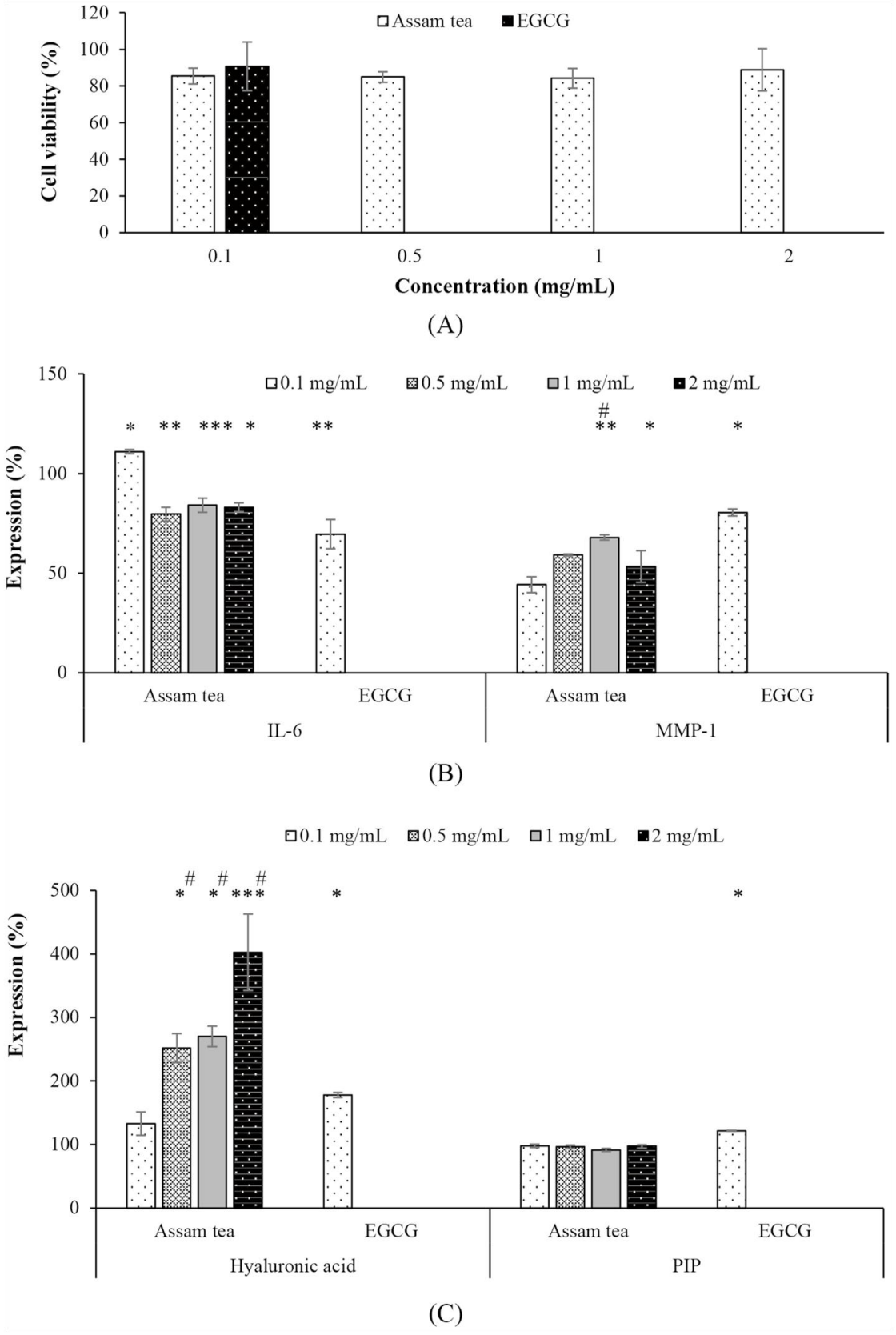

Figure 4 Safety (A), IL-6 and MMP-1 (B), and hyaluronic acid and PIP (C) expressions examined in human ex vivo skin model
Note: *p<0.05, **p<0.01, ***p<0.001 compared with control untreated group; #; p<0.05 compared with EGCG

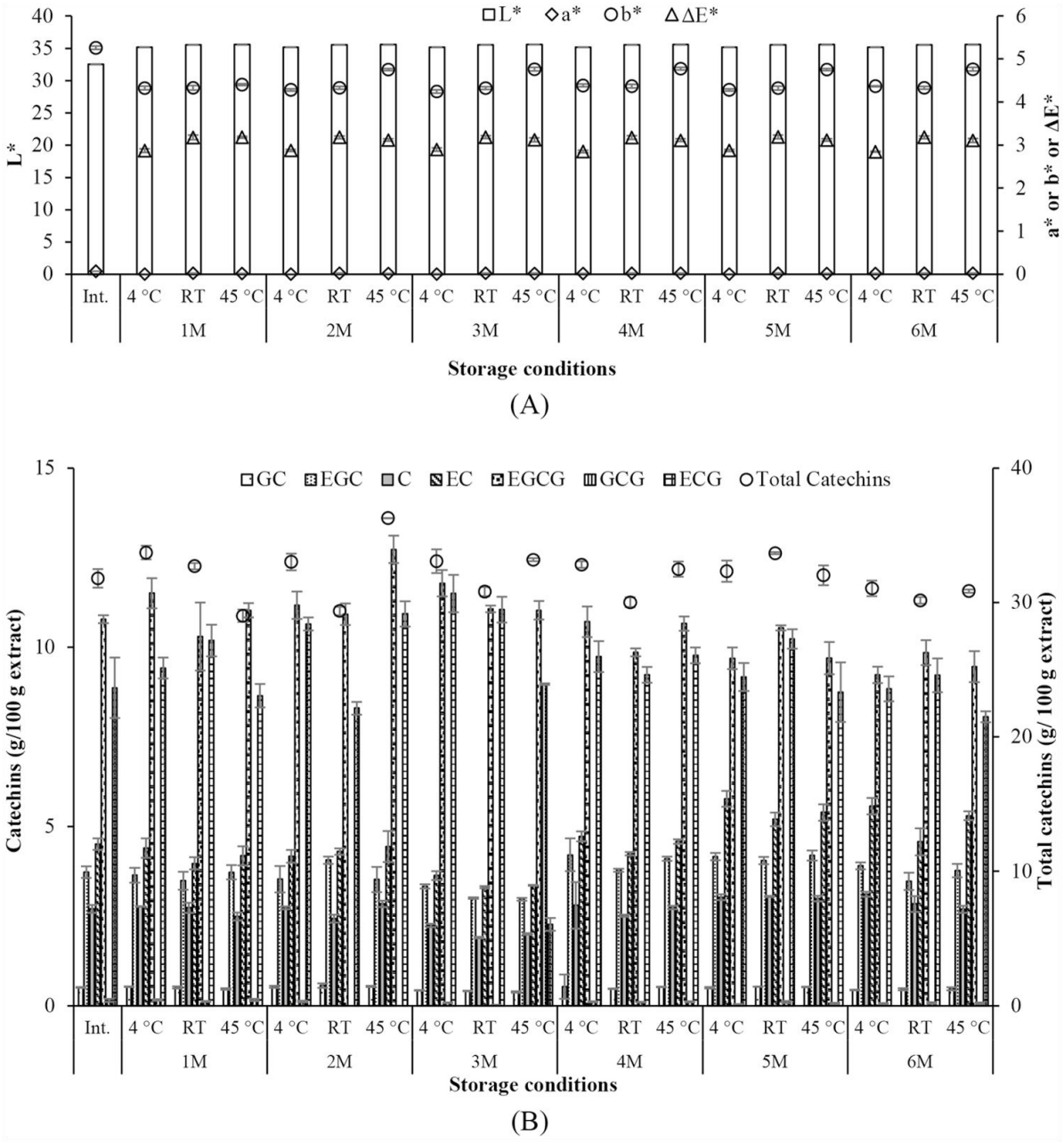

Figure 5 Stability of Assam tea extract following 6 months storage under diferent conditions

Note: A: Changes in color parameters of ATE after six months of storage under different conditions (4°C, room temperature, and 45°C). The color parameters of ATE showed no significant changes, indicating that its physicochemical properties remained stable. B: Changes in catechin content of ATE under the same storage conditions. During the six-month storage period, the catechin content in ATE decreased slightly (2-5%), but the relative change was less than 20%. This indicates that ATE has good chemical stability under these storage conditions

2 Insight of Research Findings

The study found that ATE exhibited strong free radical scavenging activity in various antioxidant assays and demonstrated significant anti-photoaging and anti-inflammatory effects in human skin cells and co-culture models. Specifically, ATE significantly inhibited UV-induced expression of IL-6, IL-8, MMP-1, and MMP-9 while promoting the synthesis of hyaluronic acid and collagen. These results indicate that ATE has potential in the prevention and treatment of photoaging and aging.

3 Evaluation of the Research

Based on the systematic experimental design and the application of various models, the study comprehensively demonstrated the bioactivity and stability of ATE. The experimental results support the feasibility of ATE as an active ingredient in the next generation of anti-photoaging and anti-aging products. However, further clinical research and long-term safety evaluations are still necessary.

4 Concluding Remarks

Catechin-rich Assam tea extract has shown significant protective effects in the treatment of photoaging and aging. The research results indicate that ATE has good chemical and biological stability, making it suitable for the development of innovative anti-aging products. Future research should further evaluate the stability, safety, and anti-aging efficacy of ATE in actual products, and conduct clinical validations to ensure its effectiveness and safety in humans.

5 Access the Full Text

Kanlayavattanakul M., Khongkow M., Klinngam W., Chaikul P., Lourith N., and Chueamchaitrakun P., 2024, Recent insights into catechins-rich Assam tea extract for photoaging and senescent ageing, Scientific Reports, 14(1): 2253. https://doi.org/10.1038/s41598-024-52781-2

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I sincerely appreciate the open-access policy of *Scientific Reports*, which allows readers to freely share this valuable research. I would also like to thank the research team led by Mayuree Kanlayavattanakul for their outstanding work, which provides a valuable case for studies on photoaging and aging treatment. Given that reviewers may have different perspectives on the interpretation of the data and results, I apologize if my analysis and evaluation differ from the authors' original intent. I look forward to further research to delve deeper into the mysteries of this field.