Molecular Mechanism of Anti-Glycating Activities of Some Dietary Agents and their Active Constituents

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Introduction

•Many drugs are present for diabetes treatment, but no drug is available for diabetic complications.

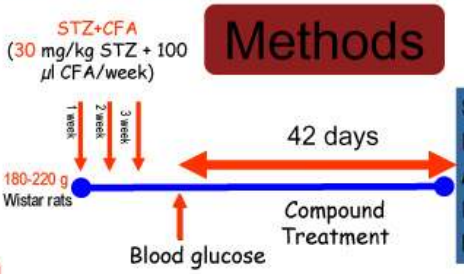
• In this regards, plant material especially dietary agents may play an important role for the management of diabetic complications.

•Here we explore the mechanism of actions of pure compounds from dietary agents.

Objective

To explore the molecular mechanism of antiglycation activities of cinnamaldehyde (TCA), ellagic acid (EA), and eugenol (EU) in CFA-Streptozotocin induced type 2 diabetic nephropathy (DN) rats.

Methods



Results

Cinnamomum cassia (CC)

Emblica officinalis (EO)

Aegle marmelos (AM)

Fig 1. Effect of Dietary agents and their active constituents (A-E) on (A) HbA1c (early glycation) in type 2 diabetic rats; (B) fasting blood glucose, (C) serum insulin, (D) HbA1c, and (E) serum AGEs in diabetic nephropathy rats. Values are expressed as Mean ± SEM and significantly different at their *p* values, *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$ *vs.* DN. *(n=6-11)*

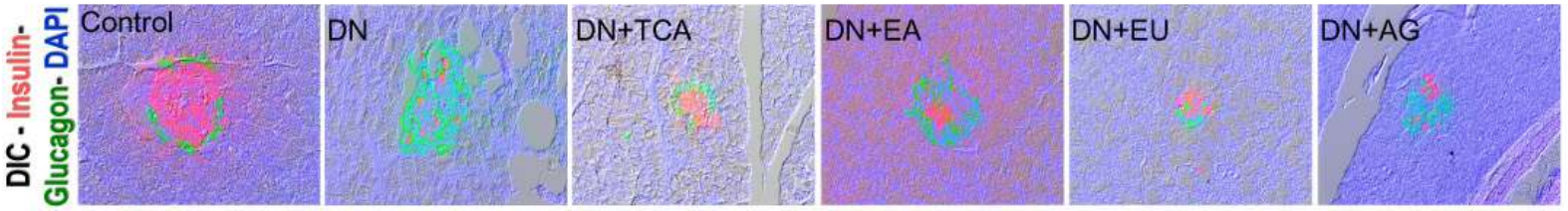


Fig 2. Immunohistochemial comparisons of cinnamaldehyde (TCA), ellagic acid (EA), and eugenol (EU) treated pancreatic α and β- cells with control, diabetic & AG-treated DN rats. Magnification:20x. (DIC, differential interference contrast microscopy; AG, aminoguanidine)

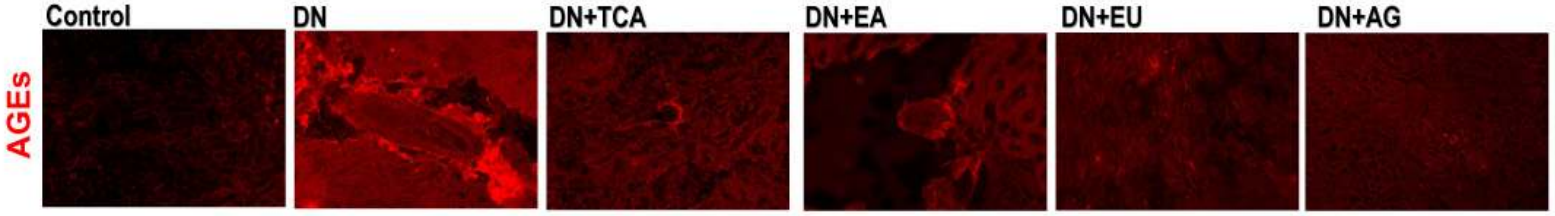


Fig 3. Modulation of AGEs in experimental groups by pure compounds in Kidney - Immunohistochemial comparisons of cinnamaldehyde (TCA), ellagic acid (EA), and eugenol (EU) treated renal sections (stained with AGEs and CML) with control, diabetic & AG-treated DN rats. Magnification:20x. Diabetic kidney sections showing deposition of AGEs within glomerulus, tubules, and artery lumen.

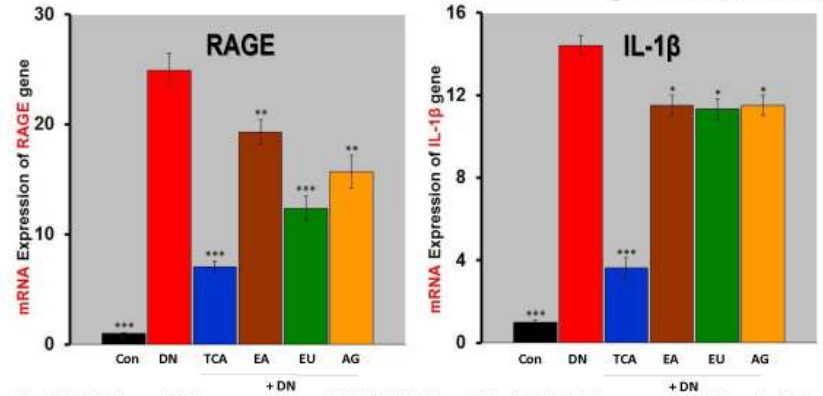


Fig 4. Relative mRNA expression of RAGE (*left*) and IL-1β (*right*) in experimental rats kidney. Values are significantly different at their *p* values, *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$ *vs.* DN.

Conclusion

•***Cinnamomum cassia*, *Embllica officinalis*, and *Aegle marmelos*** **prevent formation of early glycation in type 2 diabetic rats.**

•**TCA, EA, and EU, major compounds from *Cinnamomum cassia*, *Embllica officinalis*, and *Aegle marmelos* (dietary agents) respectively, prevent early and advanced glycation formation by modulating β-cell function and insulin secretion, RAGE and IL-1β expression.**

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