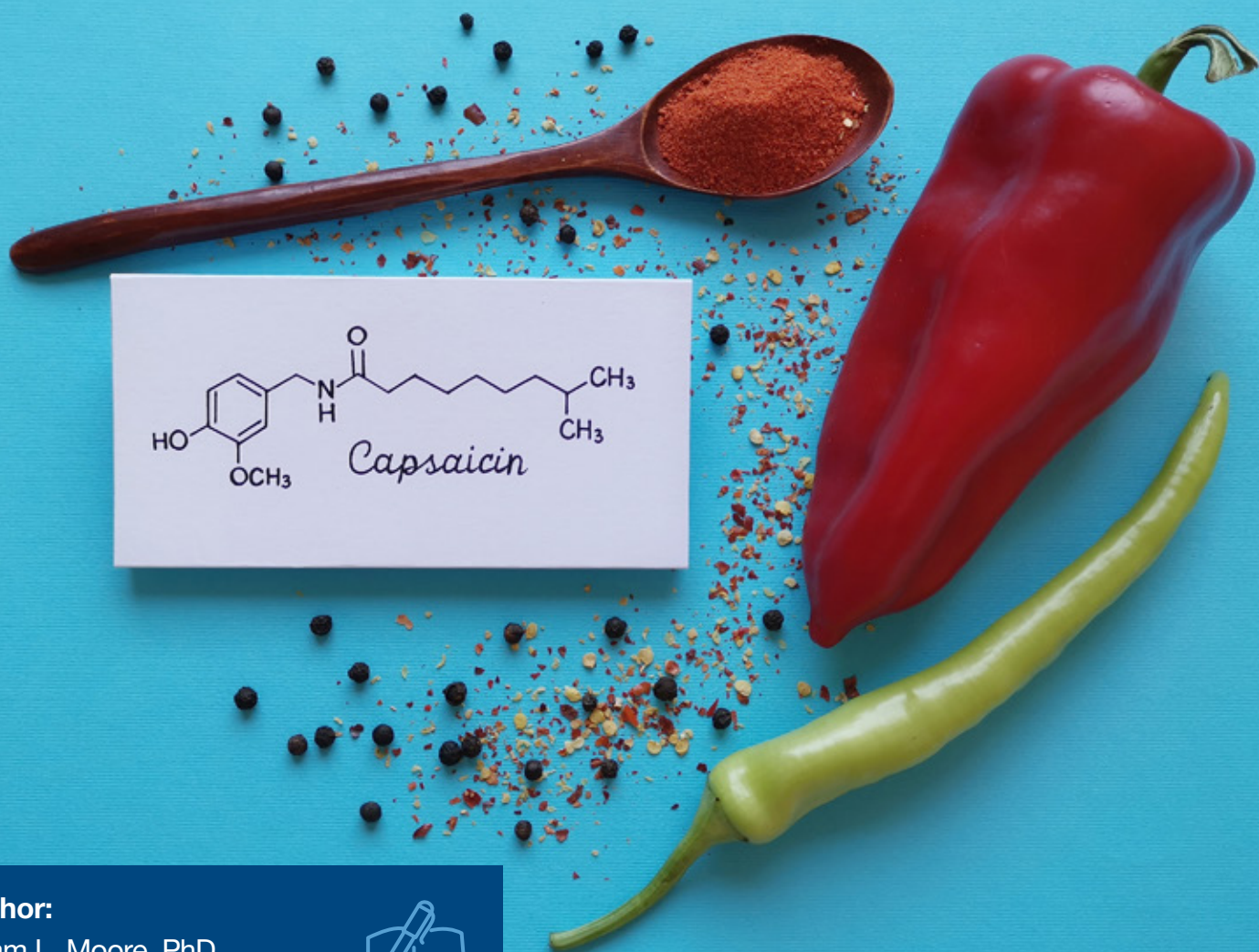


THE HEAT IS ON: The Isolation of Capsaicin for Therapeutic Treatments

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Application

The burning associated with ingesting or touching a chili pepper has been well documented as originating from the organic molecule, capsaicin. Capsaicin is widely accepted as the pepper's natural defense system, but has also been exploited by the medical community.¹ Capsaicin research has indicated that it and its analogs contribute to reduced cholesterol, blood lipids, blood sugar, and has anti-, -oxidative, -inflammatory, -obesity, and analgesic properties.²

Conversely, capsaicinoids were implicated as carcinogenic in some studies. Yet further investigation has led to findings that show apoptotic actions in breast and prostate cancers indicating complex interactions.³ To further complicate matters, capsaicin, has been shown to be a chemotherapy sensitizing agent when combined with 5-Fu, cisplatin, and pirarubicin, thereby enhancing the efficacy of these therapeutic techniques.⁴

With these applications in mind, we set out to isolate the major capsaicinoids utilizing the Hamilton PRP-C18 reversed-phase HPLC column (5 µm). Formic acid (0.1%) was used as the aqueous mobile phase due to the compatibility with both mass spectroscopy and UV detection. As a test of the isocratic method, Bishops Crown peppers were

dried, macerated to a fine powder and extracted with ethanol, followed by filtration and injection of the sample. The results showed good correlation with literature values at 10190 Scoville Heat Units.⁵

The excellent peak shape can be attributed to beneficial interactions between the capsaicinoids and the PS-DVB core as well as hydrophobic interactions associated with the octadecyl alkyl chains traditionally used for this separation. Unlike traditional ODS columns which cannot usually be reconditioned, the Hamilton PRP-C18 column can be easily regenerated making the stationary phase an indispensable tool in the synthetic chemists' arsenal.

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3. Bode A M, Dong Z. *Cancer Res.* 2011, 71, 2809-2814.
4. Zheng L, Chen J, Ma Z, et al. *Mol Med Rep.* 2016, 13, 881-887.
5. Zamljen, T., Jakopč, J., Hudina, M. et al. *Sci Rep* 2021, 11, 4932.

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Chromatogram and Compound Results

Column Information

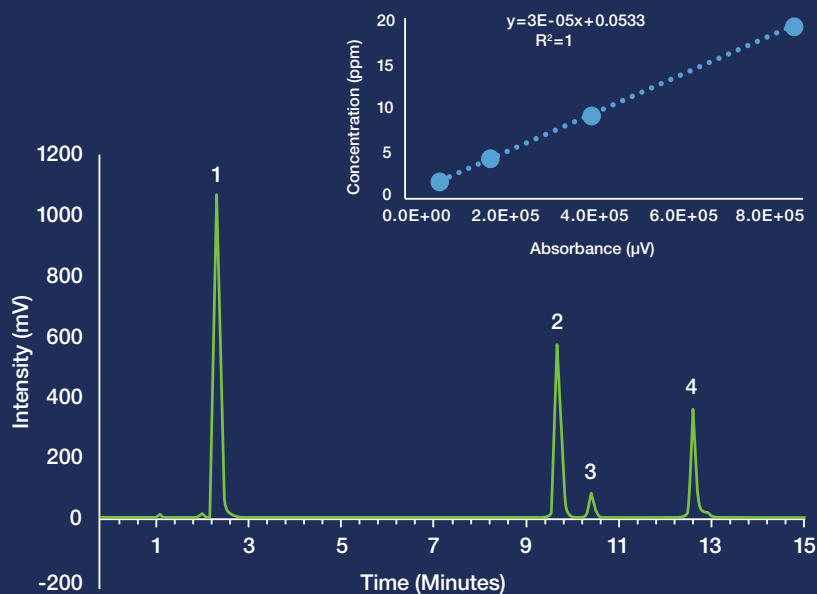
Packing Material	PRP-C18, 5 µm
Dimensions	150 x 4.6 mm
P/N	79676

Chromatographic Conditions

Gradient	0.0–7.00 min 40 %B 8.01–12.00 min 40–95 %B
Temperature	35°C
Injection Volume	5 µL
Detection	UV at 280 nm
Eluent A	0.1% Formic Acid
Eluent B	Acetonitrile
Flow Rate	2.0 mL/min

Compounds:

- 1: Nordihydrocapsiate
- 2: Capsaicin
- 3: Dihydrocapsaicin
- 4: Capsiate



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Hamilton Company is a global manufacturer and supplier of world-class analytical components, medical instrumentation, temperature control systems, laboratory robotics and automated liquid handling equipment. For more than 35 years, Hamilton Company has developed and manufactured pressure-stable, polymeric polystyrene-divinylbenzene (PS-DVB) HPLC columns that are used in most of the world's top chromatography labs. With a wide range of particle sizes, pore sizes, pH stability from 1 to 14, temperature resistance over 100°C, and chemistries to match most analyte types, Hamilton polymeric columns are the chromatographer's choice for challenging separations.

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