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## APPENDIX 1. TiARA Initiatives to Improve Awareness, Treatment and Management

### **PUBLICATIONS by TiARA Committee Members**

\*ASCI (Australasian Society of Clinical Immunology and Allergy)

#### **Medical Journals: International (review articles in peer reviewed journals) (4)**

2024

Invited Editorial in Allergy (top ranking Allergy Journal world-wide).

van Nunen S. Quantifying the allergenic potency of mammalian meat sources, an important step in providing a framework for improved management of mammalian meat allergy after tick bite (alpha gal syndrome/AGS).

2022

Chacon Osorio Gina R, Palraj Raj, van Nunen Sheryl A, White Michael J. Previously Unrecognized Alpha-Gal Syndrome in the upper Midwest, USA, cases diagnosed at the Mayo Clinic. Mayo Clinic Proceedings Mayo Clin Proc. 2022 Sep;97(9):1754-1755.  
Doi: 10.1016/j.mayocp.2022.07.003.

2015

van Nunen S. Tick-induced allergies-Mammalian meat allergy, tick anaphylaxis and their significance. Asia Pac Allergy 2015;5: 3-16. DOI: 10.5415/apallergy.2015.5.1.3

2014

van Nunen S. Galactose-Alpha-1,3-Galactose, Mammalian Meat and Anaphylaxis: A World-wide Phenomenon? Current Treatment Options in Allergy. September 2014; Vol 1, Issue 3:262-277. DOI: 10.1007/s40521-014-0022-0

#### **Medical Journals in Australia (review articles in peer reviewed journals) (4)**

2025

van Nunen S: Review of Tick-induced allergies: Mammalian meat allergy after tick bite and tick anaphylaxis. Solicited by the Editor of the Internal Medicine Journal (journal of the Royal Australasian College of Physicians) [in preparation].

2022

van Nunen S, Ratchford A. Focus on Anaphylaxis: Managing Mammalian Meat Allergy and Tick Anaphylaxis. Medicine Today 2022 July; 23(7 Suppl): 11-17.

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<https://medicinetoday.com.au/mt/focus-on-anaphylaxis>

2021

van Nunen S, Ratchford A. Managing Mammalian Meat Allergy and Tick Anaphylaxis.

Medicine Today 2021 March; Vol 22 (3): 401-407.

2020

van Nunen S, Ratchford A. Tick-induced Allergies: Mammalian Meat Allergy and Tick Anaphylaxis. Australian Doctor: How to Treat. 25 Sep 2020. Reprinted "Best of... 2020"

### **Australian Entomologists and Veterinary Practitioners (5)**

van Nunen S. Beating the Bite of Emerging Pest and Vector-Borne Disease Threats in Australia Symposium Proceedings. Centre for Infectious Diseases & Microbiology-Public Health (CIDM-PH), Institute of Clinical Pathology & Medical Research, Westmead Hospital, Westmead and Marie Bashir Institute for Infectious Diseases & Biosecurity (MBI), Westmead Millenium Institute, Westmead, Australia. Allergies to Ticks. September 2015.

van Nunen S, Canfield P. How much do you know about human tick-related diseases? CVE Control and Therapy Series 2014: "Christmas Edition".

van Nunen S, Canfield P. How much do you know about human tick-related diseases? CVE Control and Therapy Series 2014: 276; 23- 24.

van Nunen S, Canfield P. How much do you know about human tick-related diseases? Information Will Prove Useful To Your Clients. Partners In Practice Spring 2014: 28-30.

van Nunen SA, Canfield PJ. Information on human tick-related diseases for veterinary practitioners. Boardtalk Issue 40, May 2014. Veterinary Practitioners Board website. [www.vpb.nsw.gov.au](http://www.vpb.nsw.gov.au)

### **Original articles in peer-reviewed journals (8)**

2025

Nicholas Della Marta, Alexander Yuile, Claire Mok, Joe Wei, Meredith Oatley, Tracey Skinner,

Samuel Miller, Sheryl van Nunen, Stephen John Clarke, Connie Irene Diakos, Madhawa De Silva, David Chan, Gavin M. Marx, Nick Pavlakis. A protocol for pre-treatment testing for

That

antibodies to galactose- $\alpha$ -1,3-galactose to mitigate the risk of cetuximab

3/-

hypersensitivity reactions. (Submitted for publication, 2024)

2022

Langley DB, Schofield P, Nevoltris D, Jackson J, Faulks M, Jackson JKL, Burk M, Matthews J, Basten A, Goodnow CC, van Nunen S, Reed JH, Christ D. Genetic and structural basis for the human anti- $\alpha$ -galactosyl response. Proceedings of the National Academy of Science (PNAS) July, 2022 Vol. 119 No. 28 e2123212119

<https://doi.org/10.1073/pnas.2123212119> 1 of 11

Vernon ST, Kott KA, Hansen T, Finemore M, Baumgart KW, Bhindi R, Yang J, Hansen PS, Nicholls SJ, Celermajer DS, Ward MR, van Nunen SA, Grieve SM, Figtree GA. IgE sensitization to  $\alpha$ -Gal is Associated with Non-Calcified Plaque, Obstructive Coronary Artery Disease and ST Elevation Myocardial Infarction. Arteriosclerosis, Thrombosis and Vascular Biology 2022; 42:352-361.

<https://www.ahajournals.org/doi/10.1161/ATVBAHA.121.316878>.

2020

Yuile A, Fanuli C, van Nunen S, Diakos C, Clarke S, Steiner C, MacMillan R, Oatley M, Pavlakis N. Increased rates of cetuximab reactions in tick prevalent regions and a proposed protocol for risk mitigation. Asia Pacific Journal of Clinical Oncology 2021 Dec 17; 6: 448-453/. doi:10.1111/ajco.13465

2019

Schimmel J, Fawaz B, Renzi M, Heymann WR, van Nunen S, Manders S. Mammalian meat allergy-beyond urticaria? International Journal of Dermatology 2020 Aug;59 (8): e 312-314. doi:10.1111/ijd.14897

Taylor B, Ratchford A, van Nunen S, Burns B. Tick killing in situ before removal to prevent allergic and anaphylactic reactions in humans: a cross-sectional study. Asia Pacific Allergy 2019;9:e15.

2018

Kwak M, Somerville C, van Nunen S. A novel Australian tick *Ixodes (Endopalpiger) australiensis* inducing mammalian meat allergy after tick bite. Asia Pac Allergy 2018 Jul;8(3); e31.

2009

van Nunen SA, O'Connor KS, Clarke LR, Boyle RX, Fernando SL. An association between  
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tick bite reactions and red meat allergy in humans. Med J Aust 2009;190 (9):510-511.

### **Government Reports and Invited Expert Opinions (7)**

van Nunen S. On behalf of ASCIA (Australasian Society of Clinical Immunology & Allergy):  
Detailed  
Commentary upon ANZCOR (Australian & New Zealand Committee on Resuscitation) & ARC  
(Australian Committee on Resuscitation) ANZCOR Guideline 9.4.3-Envenomation from Tick Bites and  
Bee, Wasp and Ant Stings June 2021.

van Nunen S. On behalf of ASCIA: Detailed Commentary upon ILCOR (International Liaison  
Committee on Resuscitation) CoSTR (Consensus of Science with Treatment Recommendations) Tick  
Removal Review Paper May 2021.

van Nunen S. Invitation to consult on educational resources related to ticks and debilitating  
symptom complexes attributed to ticks (DSCATT): Guidance Notes 1-5 and Factsheets 1-7. April/May  
2021.

van Nunen S. TiARA (Tick-induced Allergies Research and Awareness) submission to the  
Parliamentary Inquiry into allergies and anaphylaxis. November 2019 Submission 137.  
Hansard transcript 2020.

van Nunen S. Submission #137. Parliamentary inquiry into allergies and anaphylaxis.

[file:///C:/Users/Sheryl%20Van%20Nunen/Downloads/Sub137%20-%20TiARA%20\(6\).pdf](file:///C:/Users/Sheryl%20Van%20Nunen/Downloads/Sub137%20-%20TiARA%20(6).pdf)

van Nunen S. Invitation to consult on educational resources related to ticks and debilitating  
symptom complexes attributed to ticks (DSCATT): Guidance Notes 1-5 and Factsheets 1-7. April/May  
2021.

van Nunen S. TiARA (Tick-induced Allergies Research and Awareness) submission to the  
Parliamentary Inquiry into allergies and anaphylaxis. November 2019 Submission 137.

Evidence: Hansard transcript 2020.

### **Short papers (published in peer reviewed journals) (37)**

2025

Sharp E, van Nunen S, Stone C, Koirala A. Safe vaccination in people with mammalian  
meat allergy? Australasian Society of Infectious Diseases Annual Scientific Meeting.

Canberra, Australia. 3-5 April 2025.

5/-

Nicholas Della Marta, Alexander Yuile, Claire Mok, Joe Wei, Meredith Oatley, Tracey Skinner, Samuel Miller, Sheryl van Nunen, Stephen John Clarke, Connie Irene Diakos, Madhawa De Silva, David Chan, Gavin M. Marx, Nick Pavlakis. A protocol for pre-treatment testing for antibodies to galactose-alpha-1,3-galactose to mitigate the risk of cetuximab hypersensitivity reactions. American Society of Clinical Oncology, Gastrointestinal Cancers Symposium. January 23-25, 2025.

2024

Hongkai Tan, Sheryl van Nunen, Kevin Broady, N Alice Lee. Confirmation of the presence of alpha gal in *Ixodes holocyclus* and probable role of glycosylated tick proteins in tick anaphylaxis. Intern Med J. 2024: Vol 54, Issue s4, 1-45, November. 2024.

Sheryl van Nunen, Troy Wanandy, Dianne Campbell, Jennifer Koplin, Angela Young,

Tenaya

Jamieson, Adriana Le, Kymble Spriggs, Celia Zubrinich, Chino Yuson, Emily Mulcahy, Wun Lau, Harriet Edmund, Kirsten Perrett. Perceived deficiencies in educational resources for insect allergy sufferers in Australasia and potential solutions: NACE Australasian Insect Allergy Survey. Intern Med J 2024: Vol 54, Issue S4, 1-45, November 2024.

Sheryl van Nunen, Troy Wanandy, Dianne Campbell, Jennifer Koplin, Angela Young,

Tenaya

Jamieson, Adriana Le, Kymble Spriggs, Celia Zubrinich, Chino Yuson, Emily Mulcahy, Wun Lau, Harriet Edmund, Kirsten Perrett. Spectrum of insect allergy in Australia and New Zealand: NACE Australasian Insect Allergy Survey. Intern Med J 2024: Vol 54, Issue s4, 1-45, November 2024.

2023

Bronte Cross, Melanie Burk, Jordan Symons, Katherine Duong, Ayesha Owen, David Boettiger, Andrew Ratchford, Sheryl van Nunen. Tick Anaphylaxis: Risk Factors, Clinical Features, Co-Sensitisation and Its Clinical Relevance. (2023), Intern Med J, 53: 26-26. [https://doi.org/10.1111/imj.18\\_16230](https://doi.org/10.1111/imj.18_16230)

Katherine Duong, Melanie Burk, David Boettiger, Bronte Cross, Jordan Symons, Ayesha Owen, Andrew Ratchford, Sheryl van Nunen. Tick Anaphylaxis: The Influence of Environmental Factors on Tick Anaphylaxis Presentations. (2023), Intern Med J, 53: 26-27. [https://doi.org/10.1111/imj.18\\_16230](https://doi.org/10.1111/imj.18_16230)

Jordan Symons, Melanie Burk, Bronte Cross, Ayesha Owen, Katherine Duong, David Boettiger, Andrew Ratchford, Sheryl van Nunen. Tick-induced Mammalian Meat Allergy: Risk Factors and Clinical Features in a Large Australian Cohort. (2023), Intern Med J, 53: 22-22. [https://doi.org/10.1111/imj.18\\_16230](https://doi.org/10.1111/imj.18_16230)

Ayesha Owen, Mary Simons, Katherine Duong, Jordan Symons, Bronte Cross, Andrew Ratchford, Sheryl van Nunen. A Systematic Review of Tick Removal Techniques:

Relationship to Outcomes of Tick-induced Allergic Reactions and Tick-borne Illnesses. (2023), Intern Med J, 53: 30- 31. [https://doi.org/10.1111/imj.18\\_16230](https://doi.org/10.1111/imj.18_16230)

6/-

Sheryl van Nunen, David Boettiger. Cancer Incidence, Cancer Mortality and Tick-endemicity in Regional Australia. (2023), Intern Med J, 53: 34-34. [https://doi.org/10.1111/imj.18\\_16230](https://doi.org/10.1111/imj.18_16230)

2022

Doggett SL and Lilly DG. (2022). Fact Sheet: Soft Ticks. *FAOPMA Magazine*, Oct:128-129.

Doggett SL. (2022). Book Review: Climate, Ticks and Disease. *FAOPMA Magazine*, Jul: 60-1

2021

van Nunen S, Ratchford A, Hawkins D. Kounis Syndrome in Tick Anaphylaxis. Internal Medicine Journal 2021 October, Vol 51, Issue S4, 1-27.

2020

Vernon S, Kott K, Hansen T, van Nunen S, Figtree G. Association of mammalian oligosaccharide galactose-1,3-galactose ( $\alpha$ -Gal) with atherosclerotic coronary artery disease. Heart, Lung and Circulation 2020 Nov 8; 29: S237-238.

Taylor BWP, Ratchford A, van Nunen S, Burns B. Tick killing in situ before removal to prevent allergic and anaphylactic reactions in humans: A cross-sectional study. Emergency Medicine Australasia 2020 Mar 4; 32:S1: 28-72.

2019

Yuile A, Fanuli C, van Nunen S, Diakos C, Clarke S, Steiner C, MacMillan R, Oatley M, Pavlakis N. Cetuximab anaphylaxis and tick bites – a rare but important association for patients living in high tick prevalence areas. RACP Trainee Research Day 2019.

Lauer S, Yuile A, Diakos C, Clarke S, Pavlakis N, van Nunen S. Near-fatal cetuximab anaphylaxis with no history of being tick-bitten or having mammalian meat allergy: alpha-gal ImmunoCAP® screening crucial for prevention. An instance of possible IgE consumption during an anaphylaxis. ASCIA Conference, Perth, 2019. Internal Medicine Journal 2019 Vol 49: Issue S4:1-45.

Lauer S, Burk M, Mok A, Broadfoot A, Baumgart KW, van Nunen S. Adult FCIES after mammalian meat ingestion in tick-bitten individuals. ASCIA 2019. Internal Medicine Journal Vol 49; Issue S4:1-45.

Yuile A, Fanuli C, van Nunen S, Diakos C, Clarke S, Steiner C, MacMillan R, Oatley M,

Pavlakakis N. Cetuximab anaphylaxis and tick bites – a rare but important association for patients living in high tick prevalence areas. COSA, Adelaide, 2019. Asia Pacific Journal of Clinical Oncology 2019 Vol 15; Issue S9:220.

7/-

Baumgart KW, Broadfoot AJ, van Nunen SA. Sensitisation and sero-reversion to tick-bite Induced galactose-alpha-1,3-galactose, meat and dairy sensitisation in New South Wales, Australia. EAACI, Lisbon, 2019. Allergy 2019 Vol 74; Issue S106: 376-853. JIF 2014

Sheryl van Nunen, Antony Basten, Nicholas Cowdery, Derek Anderson, Paul Canfield, Kevin Broady, Maria Said, Andrew Ratchford, Stephen Doggett, Edith Arns, Geoff Cook, Stephen Ginsborg, Raymond Mullins. Tick removal techniques practised by tick anaphylaxis sufferers. Australasian Society of Clinical Immunology and Allergy (ASCIA), 2014. Melbourne. Internal Medicine Journal 2014: 44; Issue Suppl S4;1-37. DOI 10.1111/imj.12546.

Baumgart KW, Mok A, Sivertsen T, Mullins R, van Nunen S. Allergen-specific IgE after Anaphylaxis to Tick or Mammalian/Marsupial Meat in Australia. European Academy of Allergy and Clinical Immunology Congress, Copenhagen. Allergy 2014: Vol 69, s99;1-646.

van Nunen S, Mullins R, Baumgart K, Fernando S, Fulton R, Ratchford A, Broady K, Basten A. Alpha gal and Mammalian Meat Specific-IgE in Mammalian Meat Tolerant Tick Anaphylaxis Sufferers. European Academy of Allergy and Clinical Immunology Congress, Copenhagen. Allergy 2014; Vol 69, s99;1-646.

2013

van Nunen S, Antony Basten, Nicholas Cowdery, Derek Anderson, Kevin Broady, Maria Said,

Andrew Ratchford, Stephen Doggett, Edith Arns, Geoff Cook, Stephen Ginsborg. TiARA(Tick-

induced Allergies Research and Awareness): From regional to national resource since March 2013. New Horizons 2013: Research and Education for Optimal Health, 30<sup>th</sup> Combined Health Science Conference. Final Program & Abstract Book 2013:66.

[www.newhorizons2013.com.au](http://www.newhorizons2013.com.au)

van Nunen S, Mastroianni M, Fulton R, Fernando S, Basten A. Clinical Significance of Detectable Alphagal-Specific IgE in Individuals with Undetectable Mammalian Meat Specific IgE in Mammalian Meat Allergy Following Tick Bites. Allergy 2013;Vol 68,Suppl 98:40-41.

Sheryl van Nunen, Antony Basten, Nicholas Cowdery, Derek Anderson, Kevin Broady,

Maria Said, Andrew Ratchford, Stephen Doggett, Edith Arns, Geoffrey Cook, Stephen Ginsborg. TiARA(Tick-induced Allergies Research and Awareness). ASCIA Annual Scientific Meeting, Perth. Internal Medicine Journal 2013; Vol 43, Issue S4:1-28.  
DOI:10.1111/imj.12252 August 2013.

8/-

van Nunen SA, Said MG, Batty G. Use of expanded search criteria in diagnosing mammalian meat allergy provoked by previous tick bite in individuals who do not live in areas where ticks are endemic. Allergy 2013; Vol 68; Issue s97:708-744.

Sheryl van Nunen, Richard Fulton, Monica Mastroianni, Suran Fernando. Specific IgE directed against mammalian meat and alphagal in tick anaphylaxis. Internal Medicine Journal 2012; 42 (Suppl 4):1-16.

2011

van Nunen SA, Fulton R, Fernando S, Broady KW, Basten A. The Association between Tick Bite Allergy and Red meat Anaphylaxis: Pertinent Ecological Drivers.EcoHealth 2011;7, s157, s8-s170. DOI: 10.1007/s10393-010-0376-0.

van Nunen SA, Mastroianni M, Fulton R, Fernando S, Basten A. Clinical utility of allergen specific-IgE measurement in the diagnosis of mammalian meat/s-induced anaphylaxis associated with prior tick bites. Internal Medicine Journal 2011;41(Suppl 4):1-22.

2010

van Nunen SA, Stevenson W, Fernando SL, Basten A. A novel insect, *Ixodes holocyclus*, provoking anaphylaxis in mastocytosis. 2010 World Congress of Internal Medicine. Internal Medicine Journal 2010; Vol 40 (Suppl 1): P401,66-185.

2009

van Nunen SA, O'Connor KS, Clarke LR, Boyle RX, Fernando SL. An association between tick bite reactions and red meat allergy in humans. AllAllergy.Net- Allergy Advisor Digest, Allergy Resources International. Edited by Steinman HA. 2009, June Edition; Abstract 31,3.  
[www.allallergy.net](http://www.allallergy.net)

van Nunen SA, O'Connor KS, Clarke LR, Boyle RX, Fernando SL. Tick Bite Link to Meat Allergy. Medical News, The Clinician's Ultimate Reference, 2009; May Edition,1-2.  
[www.globalrph.com](http://www.globalrph.com)

van Nunen SA, Clarke L, Coyle L, Stevenson W, Fernando S. Severe Anaphylaxis Provoked



by IgE-mediated Reactions to Food (Red Meat) in Two Patients with Systemic Mastocytosis. Internal Medicine Journal 2009; (Suppl 5):A145.

van Nunen SA, Zaininger A, Clarke L, Coyle L, Fernando SL. Systemic Mastocytosis and Severe Anaphylaxis provoked by an IgE-mediated Reaction to a Food. Proceedings of the 9/-

XXVIII Congress EAACI Warsaw 2009; Abstract #1554b. Allergy. 2008

Fernando SL, O'Connor KS, Clarke LR, van Nunen SA. An association between local reactions to *Ixodes holocyclus* tick bites and red meat allergy. Abstract book: XXVII Congress of the European Academy of Allergology and Clinical Immunology, European Meeting of Allergy Nursing, Oral Presentation #3, Barcelona, Spain, June 2008. Allergy 2007

van Nunen SA, O'Connor KS, Fernando SL, Clarke LR, Boyle RX. An Association between *Ixodes holocyclus* Tick Bite Reactions and Red Meat Allergy. Internal Medicine Journal November 2007; 37(Suppl 5), A132. DOI: 10.1111/j.1445-5994.2007.01558.x

### **Patient Education Publications**

2023

ASCIA Information for Patients, Carers and Consumers, Tick Allergy and Mammalian Meat Allergy

2021

van Nunen S, Said M, Williams J, Doggett S. Animations ticks [www.tiara.org.au](http://www.tiara.org.au) "How to prevent a tick bite" and "How to remove a tick safely" 2021.

2019

ASCIA Information for Patients, Carers and Consumers. Tick Allergy

2013

van Nunen SA, Pearce J. Allergic Conditions caused by Tick Bites. Pamphlet. TiARA (Tick-induced Allergies Research and Awareness) Fund Publication. May, 2013.

van Nunen SA, Pearce J. Allergic Conditions caused by Tick Bites. 2013 E-pamphlet [www.tiara.org.au](http://www.tiara.org.au)

van Nunen SA, Solley GA, Mullins RA. Tick allergy. Australasian Society of Clinical Immunology and Allergy, Allergy Education Resources (AER) [www.allergy.org.au/tickallergy](http://www.allergy.org.au/tickallergy) 2013.

2012

van Nunen SA. Allergic Reactions due to Tick Bites. DVD Teaching Presentation for Emergency Physicians, General Practitioners, Physicians, Entomologists. September, 2012.

van Nunen SA, Wilks D, Kai K. Allergic Reactions due to Tick Bites. Public instructional DVD. Ku-ring-gai Council. February, 2012.

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van Nunen SA. Allergic Reactions due to Tick Bites. Public and Media Information DVD Presentation. September, 2012.

2010

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van Nunen SA, Solley GA, Mullins RA. Tick allergy. Australasian Society of Clinical Immunology and Allergy, Allergy Educational Resources (AER) [www.allergy.org.au/tick](http://www.allergy.org.au/tick)

[allergy](#)

2010.

### **Other Activities**

2016-2014

Pharmacare Product Development Honorary Consultant (Tick Off®!)

2015

Colloquium on Tick-induced allergies and the role of small mammals. TiARA (Tick-induced Allergies Research and Awareness) and the School of Biological Sciences, Conservation Ecology Group, The University of Sydney

2014

Council Tick Education Program for Workers, content developers and presenters (Willoughby, Manly and Pittwater councils): 4 sessions

NB: StateCover State WHS Excellence Award 2014: Tick Education Program for Workers.

2012

Member, ASCIA Insect Allergy Working Party

2011-2014

National Parks and Wildlife Service, Member, Tick Allergy Working Party

2010

Author (with Dr Graham Solley and A/Prof Ray Mullins), Allergy Education Resources (Tick Allergy), Australasian Society of Clinical Immunology and Allergy

## **LECTURES**

### ***International***

2024

VINMEC International Hospital “Tick-induced allergies”

11/-

2023

Northwestern University, Research Meeting, Division of Allergy and Immunology

Northwestern University Feinberg School of Medicine, Chicago, USA: 2023 Update on Tick-induced Allergies: Mammalian Meat Allergy and Tick Anaphylaxis”

13th International Spark of Life Conference: “How to Treat Ticks?”

### ***National and Interstate***

2023

ASCI Conference: Symposium: “Anaphylaxis to tick bites and mammalian meat allergy (MMA) – Update and current research initiatives, including tick anaphylaxis database”

ASCI Allergy Update for Medical Practitioners. “Red meat (alpha gal) allergy & management”

2018

Pharmacy Connect Pharmacy Guild of Australia National Conference “Tick-induced Allergies and Tick Bite Management”

2018

ASCI GP Allergy Update “Mammalian Meat Allergy” Canberra, ACT

2017

Australian Pharmacy Professional Conference. (The Pharmacy Guild of Australia). “Tick-induced allergies: mammalian meat allergy and tick anaphylaxis: Prevention and Management” National Conference 9-12 March, Gold Coast

2016

Pharmacy Assistants National Conference. “Tick-induced allergies: mammalian meat allergy and tick anaphylaxis: Prevention and Management” 29 October, Gold Coast

2016

RCPA (Royal College of Pathologists of Australasia) NSW and ACT AGM. "Mammalian Meat Allergy", 25 August, Sydney

12/-

2015

The Australasian Mastocytosis Society (TAMS) 4<sup>th</sup> Annual Conference, Sydney, Australia.  
"Tick-induced allergies: mammalian meat allergy and tick anaphylaxis and mastocytosis", 1 May, 2015.

2015

Comparative Genomics Centre, College of Public Health, Medical and Veterinary Sciences, James Cook University, Townsville, "Tick-induced Allergies: Mammalian meat anaphylaxis and tick anaphylaxis and their significance". 17 April, Townsville

2014

National Emergency Nurse Practitioners Symposium: "Tick-induced Allergies and Tick Removal Techniques". 3 May, Royal Prince Alfred Hospital, Sydney

2013

Queensland State Branch ASCIA: "Allergic Reactions Provoked by Tick Bites", 19 December, Brisbane

2013

Alphapharm National Sales Managers' Meeting: "Allergic Reactions Provoked by Tick Bites", Sydney.

### ***State and Local***

### ***Specialist Colleagues (excluding ASCIA Conferences)***

2024

National Allergy Centre of Excellence: Annual Insect Allergy Steam meeting:  
"Burden of tick-induced allergies on ED"

"Insect bites and food allergy: The heart of the matter"

2023

Northern Beaches Hospital Grand Rounds: 2023 Update on Tick-induced Allergies: MMA and Tick anaphylaxis

13/-

2019

Royal North Shore Hospital Emergency Department "Reviews of Cases Referred to the Allergy Clinic from ED 2018-2019"

2017

Poisons Information Centre NSW "Allergic Reactions, Clinical Management & Tick Removal"  
Peripheral Hospitals Emergency Medicine Conference Fairmont Leura "Tick-induced Allergies"

2016

Royal College of Pathologists of Australasia "Mammalian Meat Allergy"

Manly Hospital Emergency Department: "Tick-induced Allergies & their Prevention"

Royal College of Pathologists of Australasia "Mammalian Meat Allergy"

Hoc Mai Fellows program, The University of Sydney: "How Clinical Observations and History-Taking can Lead to New Discoveries"

2015

Entomology Conference: Beating the Bite of Emerging Pest and Vector-Borne Disease Threats in Australia: "Allergies Reactions and Ticks"

Hoc Mai Fellows program, The University of Sydney: "How Clinical Observations and History-Taking can Lead to Discoveries"

Colloquium on Tick-induced Allergies and the Role of Small Mammals. TiARA (Tick-induced Allergies Research and Awareness), Royal North Shore Hospital and the School of Biological Sciences, The University of Sydney "Mammalian meat allergy after tick bite"

2009

Royal North Shore Hospital Grand Rounds; "One man's meat..."

2008

Mona Vale Hospital Emergency Department Staff Meeting: "Red meat allergy and large local

tick bite reactions and tick bite-induced anaphylaxis”

***General Practitioners***

2023

North Sydney GP Association “Anaphylaxis and Allergies in General Practice”

14/-

2022

Northern Beaches Hospital “Tick night: Mammalian meat allergy”

2021

Dee Why General Practice: Burden of Tick-induced Allergies: Mammalian Meat Allergy & Tick Anaphylaxis. 8 December 2021.

Armchair TV for GPs: “Tick-induced allergies 2021 Update”

2015

Chatswood Radiology Centre Active Learning Module: Allergy/ENT for GPs: “Tick-induced allergies: mammalian meat and tick anaphylaxis and their significance”

Hoc Mai Fellows program, The University of Sydney: “How Clinical Observations and History-Taking can Lead to Discoveries”

***Nursing and Allied Health Practitioners***

2018

Pharmacy Practice Development Day “Aspects of allergy in hospital pharmacy practice”

2017

FAIIG Meeting “Mammalian Meat Allergy”. Food Allergy and Intolerance Interest Group (Dietitians)

2015

Pharmacy Guild Workshop. “Tick-induced Allergies: Mammalian Meat Anaphylaxis and Tick Anaphylaxis”

***Community Groups***

2024 Pharmacare Research Update: Tick-induced allergies

2023

Alexandra Hancock Media student Macquarie University “Tick-induced allergies”

2022

Probus City of Sydney Club: "Tick-induced Allergies: Mammalian Meat Allergy & Tick Anaphylaxis: A tale of newly emergent allergies, with an extraordinary evolution and surprising public health consequences"

15/-

2021

The Queen's Club: "Curiouser and curiouser- Life as a consultant immunologist in allergic Diseases"

St John Ambulance Hornsby Cadet Division

2018

Sydney Harbour Trust "Tick-induced allergies and their prevention"

Ku-ring-gai Council "Tick Talk"

2017

Ku-ring-gai Council "Tick-induced Allergies"

2016

Mt Colah Public School P & C. "Tick-induced Allergies & their Prevention & Management"

15/-

Northern Beaches Environlink Inc: "Tick-induced Allergies and their Prevention"

Pittwater Council: "Tick-induced allergies and their Prevention"

2015

Device Technologies: "Tick anaphylaxis and its management"

Northern Beaches Christian School "Tick-induced allergies: mammalian meat and tick anaphylaxis"

2015

TiARA (Tick-induced Allergies Research and Awareness) Patient Support Group Sub-committee Information Evening. Mona Vale Hospital. "Tick-induced Allergies: Preventing and Managing Tick Bites"

Quarantine Station Lecture Series: "Tick-induced allergies: mammalian meat anaphylaxis and tick anaphylaxis and their significance". "The history of tick-induced allergies: A proud story

of Australian medical science”. “Aspects of tick biology”. “Allergic conditions caused by tick bite, including the burden tick-induced allergies place upon Emergency Departments in tick endemic areas.”

Ku-ring-gai Council Walks and Talks Programme: “Allergic Reactions due to Tick Bites”

16/-

2014

Garvan Institute of Medical Research: Seminar Program- The Immune System in Health and Disease “Tick Allergy in the Sydney Basin and its Management”

Ku-ring-gai Council Walks and Talks Programme: “Allergic Reactions due to Tick Bites”

St Andrew’s Uniting Church South Turramurra Neighbourhood Program: “Allergic Reactions Provoked by Tick Bites”

Ku-ring-gai Rotary Club: “Allergic Reactions Provoked by Tick Bites”

2013

Chatswood Rotary Club: “Allergic Reactions Provoked by Tick Bites”

Ku-ring-gai Council Walks and Talks Programme: “Allergic Reactions due to Tick Bites”

Chase Alive Group, Kalkari Education Centre, “Allergic Reactions due to Tick Bites”

Lane Cove Council Talk: “Allergic Reactions Provoked by Tick Bites”

2012

Ku-ring-gai Council Walks and Talks Programmes: “Allergic Reactions due to Tick Bites (2)”

Ku-ring-gai Council Walks and Talks programmes: “Allergic Reactions due to Tick Bites (1)”

## **MEDIA ADVOCACY**

On behalf of the Australasian Society of Clinical Immunology and Allergy, Royal North Shore Hospital, the Royal Australasian College of Physicians, The University of Sydney, Northern Beaches Hospital and TiARA (Tick-induced Allergies Research and Awareness) and National Allergy Centre of Excellence.

### **Podcasts**

2023 “Tick Tick Boom: A Global Health Puzzle-The inside story of an unusual allergy and its worldwide impact” TiARA <https://www.tiara.org.au/ticktickboom>

**Video production:** 2018 “Tick bite prevention and management” TiARA with Pharmacare

**Video presentations:** 2014 “Tick Bite Prevention and Management” for Tick Safe®

**Book Mention:** 2014 House of Karls Dr Karl Kruszelnicki. “Meat Allergy”. Pan Macmillan



Pty Limited, Australia 2014 ISBN 978-1-743-51951-6

**Television:** 2024 Channel 7, Ticks

17/-

2023 ABC Landline Steven Schubert "MMA" 27.8.23  
2020 Channel 7 The Morning Show "Ticks" Larry Emdur/Kylie Gillies 20.11.20  
2018 Insight Jenny Brockie: "How sick can you get from a tick?" 3/2018,  
Replayed by popular request 11/2018  
2017 Channel 7 The Morning Show "Mammalian Meat Allergy after tick bite"  
2015 7 News: "Tick Anaphylaxis increase". 12/15  
2015 ABC Catalyst: "Mammalian Meat & Tick Anaphylaxis"  
2013 Today Tonight, Channel 7. "Tick-induced allergies"

**Radio:** 2023 ABC Canberra Breakfast Radio Lish Fejer "Ticks"  
2021 ABC Illawarra (MMA" 7/20 Breakfast Nick Rheinberger  
2020 ABC Central Coast "Ticks" 12/20 Breakfast Scott Levi  
2020 ABC 702 "Ticks" 11/20 Weekend Mornings Simon Marnie  
2020 ABC 702 "Ticks" 10/20 Weekend Mornings Simon Marnie  
2020 ABC 702 "Ticks" 10/20 Breakfast Wendy Harmer/Robbie Buck  
2020 ABC Sunshine Coast Annie Gaffney: "Mammalian meat allergy & Ticks" 3/10  
2020 ABC Anna Salleh Health & Wellbeing 1/20 "Ticks"  
2019 ABC "Mammalian meat allergy and Ticks" 9/19  
2019 ABC SE NSW Sophie Longden "Mammalian meat allergy" 2/19  
2018 ABC SE 2/2018 "Mammalian meat allergy"  
2018 ABC Sunshine & Cooloola Coasts: Mornings with Annie Gaffney:  
"Mammalian meat allergy following tick bites"  
2017 ABC Wendy Harmer: Ticks 9/17  
2017 ABC Caboolture/Moreton Bay Keith Burke: "Mammalian meat allergy" 4/17  
2017 ABC Chris Bath: "Mammalian meat allergy" 11/17  
2016 2HD Brent Bultitude: "Mammalian meat allergy" 10/16  
2016 ABC 702 Breakfast "Mammalian meat allergy"

2016 2GB Lucas Grant's program: "Tick-induced allergies" 4/16  
2016 2GB Warren Moore program: 'Tick anaphylaxis: increased numbers' 1/16  
2015 ABC Richard Glover: Drive program: "Tick removal techniques" 2/15  
2015 ABC Sunshine & Cooloola Coasts: Mornings with Annie Gaffney:  
"Mammalian meat allergy following tick bites" \

18/-

2015 Sveriges Radio (Swedish Public Radio): "Mammalian meat allergy  
following tick bites"  
2014 ABC Margaret Throsby: Midday: "Mammalian meat allergy and tick bites"  
(originally broadcast in March 2014, repeated December 2014)  
2014 ABC Robyn Williams' The Science Show: "Mammalian meat allergy after  
tick Bites"  
2014 ABC South East NSW: "Mammalian meat allergy and tick bites"  
2014 ABC Science: Dr Karl: "Mammalian meat allergy and tick bites"  
2013 2GB Michael Smith: "Mammalian meat and tick anaphylaxis"  
2012 SWR FM 99.9 Western Sydney's People of Interest Programme  
2012 ABC News Radio

**Print Media:**

**Newspapers:**

2023 Adam Norris Editor Bellingen Shire News "Tick-induced Allergies"  
2022 Livia Albeck-Ripka "Mammalian meat allergy"  
2021 NY Times Livia Albeck-Ripka "MMA"  
2021 Hornsby Ku-ring-gai Post Esme Mathis 28 February "Tick of disapproval for  
meat allergies" Esme Mathis  
<https://www.hkpost.com.au/news/tick-of-disapproval-for>  
2021 WAToday Aisha Dow "Hidden depth to extraordinary medical achievements  
of  
Australia Day award winners"  
2021 Brisbane Aisha Dow "Hidden depth to extraordinary medical achievements  
of Australia Day award winners"  
2021 The Age Aisha Dow "Hidden depth to extraordinary medical achievements of  
Australia Day award winners"  
2021 Sydney Morning Herald Aisha Dow "Beyond the citation, medical experts  
rewrite medical lore"

2019 The Monthly Marina Kamenev "Ticked Off"

2018 New York Times 7/18 Moises Velasquez-Manoff: "What the Mystery of the  
Tick-Borne Meat Allergy Could Reveal"

2016 The Australian Weekend Magazine 16/7 "Once Bitten" for TiARA

19/-

2016 The Daily Telegraph- 4 articles, plus "Tick Anaphylaxis" 2016 p11, 4/16

2015 Illawarra Mercury- 1 article (10/15) "Tick Anaphylaxis"

2015 Sydney Morning Herald- 4 articles (latest 10/15)

Miscellaneous:

Wall Street Journal- 2 articles

Washington Post- 1 article

**Magazines:** 2021 Honi Soit The University of Sydney 8/21 Ariana Haghighi

<https://honisoit.com/2021/08/partners-in-crime-the-enigma-of-two-culprit-allergic-reactions/>

2021 HBL (Hufvudstadsbladen) Swedish language newspaper in Finland & August

Johann Augustin- 1 article

2020 Nature: Outlook December Bianca Nogrady "Cracking the meat allergy mystery  
with the tick bite link" <https://www.nature.com/articles/d41586-020-02783-7>

2019 Australian Doctor 2/19- 1 article

**Online:**

**Social Media:**

2023 CNN Brenda Goodman 11.8.23

GARVAN INSTITUTE: Genetic & Structural Basis for the human anti- $\alpha$ -galactosyl response

06-Jul-2022 10:00PM	Tick-Bite Induced Mammalian Meat Allergy Unraveled	<a href="https://www.genetics.com">https://www.genetics.com</a>
06-Jul-2022 01:59PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.sciencemag.org">https://www.sciencemag.org</a>
06-Jul-2022 11:30AM	Not so sweet: tick-bite sugar dose can lead to meat allergies in humans	<a href="https://cosmosmagazine.com">https://cosmosmagazine.com</a>
06-Jul-2022 05:00AM	Red meat: allergy related to tick bite	<a href="https://pledgetime.com">https://pledgetime.com</a>
05-Jul-2022 11:04PM	Genetic and molecular insights into dangerous tick-bite-related meat allergy revealed	<a href="https://medicalxpress.com">https://medicalxpress.com</a>
05-Jul-2022 10:42PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://scienmag.com">https://scienmag.com</a>

05-Jul-2022 06:00PM	Genetic and molecular insights into dangerous tick bite-related meat allergies revealed	<a href="https://www.tech">https://www.tech</a>
05-Jul-2022 04:37PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://photos.a">https://photos.a</a>
05-Jul-2022 02:59PM	Clock ticks on a meat allergy treatment	<a href="https://medicalre">https://medicalre</a>
05-Jul-2022 02:47PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://aboutpain">https://aboutpain</a>
05-Jul-2022 02:01PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.new">https://www.new</a>
05-Jul-2022 01:59PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.eur">https://www.eur</a>
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05-Jul-2022 07:07AM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.scin">https://www.scin</a>
05-Jul-2022 07:06AM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.mira">https://www.mira</a>
05-Jul-2022 07:03AM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.nati">https://www.nati</a>
05-Jul-2022 12:29AM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://newsblaz">https://newsblaz</a> related%20mea
05-Jul-2022 12:29AM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://newsblaz">https://newsblaz</a> related%20mea
04-Jul-2022 01:52PM	Genetic and molecular insights into dangerous tick bite-related meat allergy revealed	<a href="https://www.ozn">https://www.ozn</a>
11-Jul-2022 08:58PM	ABC Esperance at July 11th 2022 6:58 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:58PM	ABC Goldfields at July 11th 2022 6:58 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:58PM	ABC North West WA at July 11th 2022 6:58 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:55PM	ABC Mid West and Wheatbelt AM at July 11th 2022 6:55 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:55PM	ABC Great Southern WA at July 11th 2022 6:55 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:55PM	ABC Kimberley at July 11th 2022 6:55 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:54PM	720 ABC Perth at July 11th 2022 6:54 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 08:54PM	ABC South West WA at July 11th 2022 6:54 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 07:30PM	ABC Broken Hill AM at July 11th 2022 7:00 PM	<a href="https://www.abo">https://www.abo</a>
11-Jul-2022 07:29PM	ABC West Coast SA AM at July 11th 2022 6:59 PM	<a href="https://www.abo">https://www.abo</a>

11-Jul-2022 07:27PM	891 ABC Adelaide at July 11th 2022 6:57 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 07:27PM	ABC Alice Springs at July 11th 2022 6:57 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 07:26PM	ABC North and West SA at July 11th 2022 6:56 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 07:25PM	ABC South East SA at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 07:25PM	ABC Riverland AM at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 07:25PM	105.7 ABC Darwin at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
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11-Jul-2022 06:58PM	ABC Far North Queensland at July 11th 2022 6:58 PM	<a href="https://www.abc">https://www.abc</a>
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11-Jul-2022 06:58PM	ABC North West Queensland at July 11th 2022 6:58 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:58PM	Evenings with Sarah Macdonald, Christine Anu	<a href="https://www.abc">https://www.abc</a>
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11-Jul-2022 06:58PM	91.7 ABC Coast FM at July 11th 2022 6:58 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:58PM	ABC Gippsland at July 11th 2022 6:58 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:58PM	Evenings with David Astle, Christine Anu	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:58PM	NEWS BULLETIN	<a href="https://www.abc">https://www.abc</a>
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11-Jul-2022 06:58PM	ABC Central Victoria FM at July 11th 2022 6:58 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:58PM	ABC Southern Queensland at July 11th 2022 6:58 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:57PM	ABC Western Queensland at July 11th 2022 6:57 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:57PM	NEWS BULLETIN	<a href="https://www.abc">https://www.abc</a>
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	Evenings with Sarah Macdonald	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:57PM	Evenings with Sarah Macdonald, Christine Anu	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:56PM	ABC South East NSW at July 11th 2022 6:56 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:56PM	ABC Mid North Coast NSW Radio at July 11th 2022 6:56 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:56PM	ABC Shepparton FM at July 11th 2022 6:56 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:56PM	936 ABC Hobart at July 11th 2022 6:56 PM	<a href="https://www.abc">https://www.abc</a>

11-Jul-2022 06:55PM	1233 ABC Newcastle at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	PM with Linda Mottram	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	ABC Tropical North FM at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	ABC New England North West AM at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	ABC Northern Tasmania at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	ABC South West Victoria AM at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	ABC Capricornia FM at July 11th 2022 6:55 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:55PM	Drive	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:54PM	774 ABC Melbourne at July 11th 2022 6:54 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:54PM	ABC North Queensland at July 11th 2022 6:54 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:54PM	666 ABC Canberra at July 11th 2022 6:54 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 06:54PM	ABC NewsRadio at July 11th 2022 6:54 PM	<a href="https://www.abc">https://www.abc</a>
11-Jul-2022 05:26PM	ABC Radio National at July 11th 2022 5:26 PM	<a href="https://www.abc">https://www.abc</a>

2022 Medical Republic “Ticks” 8.2.2022

2020 ABC NEWS Online “After I was bitten by a tick, I developed a rare allergy to meat.

Now I’m a quasi-vegetarian. By Menios Constantinou 12/20

<https://www.abc.net.au/news/2020-12-26/i-cant-eat-red-meat-tick-bite-not-vegan-or-vegetarian/12827118>

2020 St George & Sutherland Leader: Kirsten Lawson: “Mammalian meat allergy” 11/20

2020 ABC Online Health and Wellbeing: Anna Salleh: “Tick bites can make you really sick-  
so what is the best way to deal with them?” 1/20

2019 Byron Shire Echo: Eve Jeffery: “Ticking the boxes for *Ixodes holocyclus*” 8/19

2019 ABC Online Alle McMahon: “Mammalian meat allergy- How tick bites can cause  
allergic reactions to meat, milk and gelatine” 1/19

2018 SBS Online Bonnie Bayley: “How a tick bite could make you allergic to meat” 3/18

2017 SBS Online updated Bonnie Bayley: as above 7/17

2016 Medical Republic: Felicity Nelson: “The ticks that wipe meat off the Menu”

2016 The Guardian Australia 8/16

2016 news.com.au Vanessa Stubbs “Australians on the east coast are suddenly becoming  
deathly allergic to red meat” 15/6

2015 ABC Sunshine & Cooloolo Coasts: Jon Coghill: “Mammalian meat allergy following

tick bites" 11/15

2014 ABC Science Online Audio 2/14 MMA

2014 ABC Science Online Dr Karl's Great Moments in Science 2/2014

2014 ABC Margaret Throsby: Midday: "Mammalian meat allergy & tick bites" 3/14

2014 ABC Science Online Robyn Williams The Science Show 10/14

23/-

2014 ABC Margaret Throsby: Midday:(Canada online): Mammalian meat & tick bites12/14

### **Conference Presentations by Stephen Doggett**

Doggett SL. (2024). Ticks. North Sydney Council Bushcare Group, 15/Feb/2024.

Doggett SL., Panthowong A. and Chareonviriyaphap T. (2020). Tick studies, Summer 2019-2020. TiARA Virtual Conference, 7/July/2020.

Doggett SL. (2020). Laboratory repellent bioassays against *Ixodes holocyclus*. TiARA Committee, 27/Dec/2019.

Panthowong A, Chareonviriyaphap T, Evasco K and Doggett SL. (2019). Laboratory repellent bioassays against the ornate kangaroo tick, *Amblyomma triguttatum* (Acari: Ixodidae). TiARA Quarterly Meeting, Northern Beaches Hospital, Australia, 27/Dec/2019.

Doggett SL. (2019). Ticks and tick-borne diseases: a renaissance in research. Environmental Health Australia, Quarantine Station, 20/Aug/2019.

Doggett SL. (2018). Tick trends in the Department of Medical Entomology, 1988-2017. Tick Induced Allergies, Research & Awareness Research Committee Meeting, Northern Beaches Hospital, 20/Nov/2018.

Doggett SL. (2018). Tick trends in the Department of Medical Entomology, 1988-2017. Tick Induced Allergies, Research & Awareness Research Committee Meeting, Mona Vale Hospital, 21/Aug/2018.

Doggett SL. (2018). Ticks, tall tales & true. Paterson Allyn Williams Science Hub, James Theatre Gulgong, 30/June/2018.

Doggett SL. (2018). Ticks, Ecology and Control. Taronga Park Zoo Educational Series, Taronga Park Zoo, 17/May/2018.

Doggett SL. (2017). Lyme disease. Victorian Mosquito Management Training Course, Creswick, Victoria, 23-26/Oct/2017.

Oskam C, Owens J, Codello J, Greay T, Gofton A, Doggett S, Ryan U and Irwin P. (2017). Do we need to rethink Coxiella in Australia? 9<sup>th</sup> Tick and Tick-borne Pathogen Conference, Pullman Hotel, Cairns 27/Aug – 1/Sep/2017.

Doggett SL. (2017). Tick biology. Quarantine Station Lecture Series, 5/Mar/2017.

Doggett SL. (2016). Lyme disease; the facts. CIDMLS Educational Update, Westmead Hospital, 22/Nov/2016.

24/-

Doggett SL. (2016). Tick biology and prevention. Gleneagon Rudolph Steiner School, 19/Oct/2016.

Doggett SL. (2016). Lyme disease, is it here or is it not? A review of the evidence. Arbovirus Research in Australia/Mosquito Control Association of Australia, Gold Coast, 4-9/Sep/2016.

Doggett SL. (2016). Investigating Lyme Disease in Australia. National Arbovirus and Malaria Advisory Committee Annual Face to Face Meeting, Canberra, 4-5/May/2016.

Doggett SL. (2016). Investigating the aetiology of Lyme Disease in Australia. TiARA, RNSH, 22/March/2016.

Doggett SL. (2016). Investigating Lyme Disease in Australia. NSW Health Bug Breakfast, North Sydney, 4/March/2016.

Gofton A, Doggett SL., Ratchford A, Ryan U and Irwin P. (2016). Two Novel 'Candidatus Neoehrlichia' species in Ixodes holocyclus ticks; the first tick-borne Anaplasmatidae endemic to Australia. Australian Society of Microbiology, Canberra, June 2016.

Gofton A, Doggett SL., Ratchford A, Oskam C, Paparini A, Ryan U and Irwin P. (2016). Anaplasmatidae in Australia: the first description and characterisation of tick-borne Anaplasmatidae endemic to Australia. International Congress of Tropical Medicine and Malaria, Brisbane, Jan/2016.

Gofton A, Doggett SL., Ratchford A, Oskam C, Paparini A, Ryan U and Irwin P. (2016). Anaplasmatidae in Australia: the first description of tick-borne Anaplasmatidae endemic to Australia. The Australian Society for Microbiology 2016 Annual Scientific Meeting, Perth, Jan/2016.

Gofton A, Doggett SL, Oskam C, Paparini A, Ryan U and Irwin P. (2016). Novel Anaplasmatidae species in Australian ticks. Murdoch University Research Poster Day, Perth, Jan/2016.



25/-

## **Resources developed to improve diagnosis of tick-induced allergies**

### **1. Mammalian meat allergy after tick bite (MMA) diagnosis**

The diagnosis of this disease depends upon a typical history being elicited and confirmation of the presence of alpha gal specific IgE (ImmunoCAP) in the patient's serum (blood). This test was developed in the USA and is a standard and standardised recombinant allergen test and as such it occasions an out-of-pocket fee due to its being unsupported by Medicare (no rebate). The pathology providers charge as little as possible (the test costs the pathologist AUD 45 to buy from ThermoFisher, so the patient is charged AUD 50 (a gift to these patients from the pathology providers, as for AUD 5, it has been collected from a collection centre close to the patient's home, where the pathology provider has paid the rent, paid the blood collector, driven the blood to the central pathology laboratory for testing on the machine which has cost AUD 2 million by an employed driver, where the pathology provider's paid laboratory scientist does the test and the immunopathologist employed by the pathology provider checks the result is accurate. The pathology provider participates in the Royal College of Pathologists of Australia QAP (Quality Assurance Program) to which it is subscribed and pays the rent on the building housing the central laboratory- an unbelievable bargain really!

The test is accurate and should be supported by Medicare with an adequate rebate, as savings would accrue overall in the health system (a reduction in anaphylaxis due to cetuximab by screening prior to its use in colon cancer or head and neck cancer, for example), as it prevents treatment for life-threatening allergic reactions being required in the majority of instances see Della Marta et al. 2024. The cost of one cheap day in ICU would fund 20% of the alpha gal specific IgE Tests needed for a year busy seeing patients with tick-induced allergies and the cost of one expensive day in ICU would fund 100%.

Mammalian meat allergy after tick bite occurs along the entire Eastern seaboard of Australia chiefly above Lakes Entrance, Victoria, and below the tip of Cape York- east of the Great Dividing Range the environment optimises tick survival. Many individuals who develop MMA are of limited means and the test cost is a burden. Skin prick testing is unreliable (see van Nunen et al MJA 2009)

**NB: Inclusion of this test in the list of tests rebatable by Medicare would relieve this burden.**

Decisions regarding complex medical and dental procedures depend for safety and/or longevity of the treatment effect (e.g. aortic cardiac valve prosthesis, cancer drug selection, dental implant material to be used) upon an up-to-date test result. An up-to-date test result is needed because tick bites cause alpha gal specific IgE (allergy antibody) to be produced in those so prone (50% of individuals will make alpha gal specific IgE after two tick bites) and if further tick bites are sustained, the level of specific IgE to alpha gal can more than double after each tick bite. Each blood sucking life stage of tick (larval ticks, nymphs or adults) can alone result in the production of alpha gal specific IgE. If no further tick bites are sustained, within 18 months to 2 years there is a significant reduction in the level of the alpha gal specific IgE, however, a subsequent tick bite will re-instate the alpha gal specific IgE to its previous levels and not every tick bite (particularly from nymphs, but even from adult ticks) are noticed by an individual patient. Moreover, only 15% or so of those who become

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sensitised (develop the specific IgE to alpha gal) will have symptoms when they eat meat. This means that up to 25% or so of 60% of Australians potentially exposed to tick bites and the majority of these people will be asymptomatic when eating mammalian meat.

Any manufacturer registering a vaccine, medical device, dental material, snake anti-venom, any anti-venom made in a mammalian product e.g. rabbit blood for funnel web spider anti-venom, gelatine containing device (cell savers for spinal surgery)... can give rise to an allergic reaction, which could be fatal if the material is injected. Manufacturers should be asked to supply evidence of the presence or otherwise of alpha gal in their end product, so the patients sensitised to alpha gal do not have to necessarily avoid its use on the basis of it being an unknown (use a less satisfactory product or a product with which the surgeon is less familiar). Premature degradation of aortic valve prostheses is a recognised problem due to the production of IgG and IgM alpha gal antibodies in alpha gal exposed individuals. This is a burden to both the patient and the health care system.

See Hawkins RB, Frischak HL, Kron IL, Ghanta RK. Premature Bioprosthetic Aortic Valve Degeneration Associated with Allergy to Galactose-Alpha-1,3-Galactose. J Card Surg. 2016 Jul;31(7):446-8. doi: 10.1111/jocs.12764. Epub 2016 May 30. PMID: 27238083; PMCID: PMC5013262.

The absence of symptoms following ingestion of mammalian meat is of practical significance when considering the burden of coronary artery disease (CAD) in tick endemic regions in Australia.

See Vernon et al 2022. Research tab at [www.tiara.org.au](http://www.tiara.org.au)

In the North Sydney health district, 27% of those with CAD are SMuRFless (have no Standard Modifiable underlying Risk Factor) for CAD. The presence of alpha gal specific IgE is associated with increased soft plaque in the coronary arteries, an increased risk of obstructive coronary artery disease (hard, calcified deposits in the wall of the coronary arteries which reduces arterial elasticity) and when soft plaque bursts due to inflammation and shear stresses this results in an increased likelihood of the patient having cardiac muscle damaging "heart attack"= a STEMI (ST Elevation Myocardial Infarct) which predisposes the patient to developing ongoing heart failure versus a non-muscle damaging "heart attack" NSTEMI (Non STEMI). All considered, this means that in tick endemic regions, a probable 25% of people have a risk factor for CAD of which they are unaware (unless they check their alpha gal specific IgE). Each year in this Health District alone, this may be costing \$1.2million per annum in CAD we don't need to have, if the effects of tick bites were widely known, and strategies for the prevention of tick bites were appreciated by as many

people as know about the importance of having normal blood lipids. A campaign equivalent to the Slip, Slop, Slap, Seek and Slide campaign to prevent sun-related cancers were implemented. Such a campaign would use the evidence-based tools developed by TiARA (the animations developed by TiARA with Allergy & Anaphylaxis Australia (A&AA) “How to prevent tick bites” and “How to safely remove a tick” and the QR code “How to safely remove a tick”).

The Slip. Slop. Slap..., campaign proved to be effective with melanoma rates plummeting in the past 18 years, shown in a long-term study of teenagers and young adults which revealed the cases of melanoma in young people fell 5 per cent each year from the mid-1990s to 2010 (Green et al. <http://www.ncbi.nlm.nih.gov/pubmed/24806428>).

27/-

TiARA’s evidence-based advice of “Freeze it, don’t squeeze it”, “Kill the tick where it is and leave it to drop off by itself”, “Treat your Backyard”, “Dress for the Occasion”, “Don’t scratch anything you can’t see, because it could be a tick” and “Don’t disturb a tick because she will squeeze allergen into you” should be similarly successful along with a “what are the risks with tick bites warning” should be similarly successful.

## **2. Tick anaphylaxis diagnosis**

Australia has the highest prevalence in the world of tick anaphylaxis at least more than 50 times higher than Japan (where it is next most common).

The diagnosis is usually simple with a clearcut “I pulled out the tick and within minutes I was having a life-threatening allergic reaction (anaphylaxis)” or a less severe whole body allergic reaction.

There is no confirmatory test available currently.

An accurate test to confirm the diagnosis is necessary to be able to inform patients as to whether or not they remain allergic to ticks (tick salivary proteins). Remember, nothing lasts forever, including in our immune systems (if it did, why would we need booster vaccine doses?). To determine current allergy status improves patients’ and their families’ quality of life and reduces health care costs (if the allergy has been lost then the adrenaline administration devices may be discontinued, visits to health care professionals may be discontinued for maintenance of adrenaline administration devices and anaphylaxis action plans and for ensuring alpha gal specific IgE has resolved.

Tick anaphylaxis is due to an allergic reaction to a tick salivary protein (this is a separate allergy to the mammalian meat allergy which is due to an allergic reaction to a carbohydrate (glycan, sugar) moiety, alpha gal).

Protein allergies last indefinitely, unlike carbohydrate allergies like alpha gal, but as no antibody lasts forever in our immune system, a test is necessary to determine whether the allergy has remitted.

This initiative is being undertaken by the National Allergy Centre of Excellence (NACE) PhD Scholar under the supervision of Associate Professor Alice Lee (UNSW and NACE) and Professor Sheryl van Nunen (NACE Leadership Group, Co-chair of the Insect Allergy Stream NACE; The University of Sydney and Macquarie University).

## **Resources developed to improve treatment of tick-induced allergies**

All of the above virtually plus the

Webinar: Allergy & Anaphylaxis Australia:

<https://www.tiara.org.au/https/allergyfactsorgau/resources/webinars/mammalian-meat-allergy-webinar>

28/-

[www.tiara.org.au](http://www.tiara.org.au)

Resources tab

<https://www.tiara.org.au/new-page-87> FAQs

<https://www.tiara.org.au/mammalian-meat-and-mammalian-product-free-dietary-resources>

chrome-

extension://efaidnbmnnnibpcajpcgicfindmkaj/https://static1.squarespace.com/static/5c8ecc0db2cf79dee4986f00/t/6415409916fc5e2dca704957/1721109910967/ASCIA\_PCC\_Mammalian\_Meat\_Tick\_Allergy\_2023.pdf

Chef card

<https://allergyfacts.org.au/resources/downloads/chef-cards-eating-out/>

<https://www.tiara.org.au/dietary-information>

<https://www.tiara.org.au/tick-anaphylaxis-mammalian-meat-allergy-resources>

<https://www.tiara.org.au/website-resources>

Together with the invaluable contributions from our TiARA Ambassadors, Joy Cowdery and Richard Boyle, Grahame W and Andrew C.

<https://www.tiara.org.au/ambassadors>

## **Resources developed to improve management of tick-induced allergies**

See all of the above and

The development of the freezing agent Tick Off® involved Dr Ray Mullins and Professor Sheryl van Nunen, TiARA Committee Members.

Aerostart® an engine degreasing agent works very well in freezing ticks, however, it contains benzene, which is a Class 1 carcinogen, thus when the wart freezing treatments became available, they have had to be employed instead. Unfortunately, they were not tick specific and this created confusion in patients' minds so Professor van Nunen flew to Amsterdam to ask the manufacturer in The Netherlands, Koninklijke Utermohlen, to produce a product badged for use in ticks and offered them a suitable name for the product (Tick Off). They have since marketed the same product in Europe as Tick Away® too.

The proof of the effectiveness has relied on the work of TiARA.

2023 ASCIA FAQ for Patients and Carers

<https://www.allergy.org.au/patients/food-allergy/mammalian-meat-tick-faq>

29/-

Taylor BW, Ratchford A, van Nunen S, Burns B. Tick killing in situ before removal to prevent allergic and anaphylactic reactions in humans: a cross-sectional study. *Asia Pac Allergy*. 2019 Apr;9(2):e15

This is the only research in humans examining the outcome of tick killing methods in humans world-wide. This research was conducted at Mona Vale Hospital in the Emergency Department, with a major contribution from Dr Ben PW Taylor, where TiARA Committee member, Dr Andy Ratchford, is the Director.

Council Tick Education Program for Workers, content developers and presenters

(Willoughby, Manly and Pittwater councils): 4 sessions

Statecover Award

Food allergen cards and chef's card funded by TiARA, joint project of TiARA and A & AA.

file:///C:/Users/shery/Downloads/AAA\_FoodAllergenCards\_MEAT.pdf

### **TiARA Committee Members' Contributions**

Professor Tony Basten AO

Collaboration with the Garvan Institute of Medical Research to produce pivotal information which leads directly to potential therapies for COVID, HIV, Tuberculosis and Malaria, as well as providing information regarding the interaction of the alpha gal molecule with the immune system

<https://www.pnas.org/doi/10.1073/pnas.2123212119>

and for bringing the tick-induced allergies to the attention to the wider community through Rotary and throughout the discipline of Clinical Immunology and Allergy.

Professor Nicholas Cowdery AO and Joy Cowdery

Media advocacy with the early and very influential Catalyst program, in particular, and the

## **“ON THE DIFFICULTIES OF & TIPS FOR COPING WITH A MAMMALIAN MEAT ALLERGY”**

<https://www.tiara.org.au/joy-c>

and wise counsel from both and for disseminating information in the community, especially amongst the legal fraternity and the general community, especially in the highly tick endemic waterways on the Northern Beaches Peninsula.

30/-

Professor Emeritus Derek Anderson AM

Dissemination of the information to communities living in highly tick endemic areas and for determining that a microclimate change constitutes an influential element in the development of this now pandemic of non-communicable disease, and in medical settings and for supporting the Committee members in their endeavours.

Maria Said AM, CEO of Allergy & Anaphylaxis Australia (A & AA)

Development of the animations by A & AA with ASCIA “How to prevent tick bites” and “How to safely remove a tick” has been crucial to TiARA now having a suite of community and patient-friendly educational materials, along with the webinar and the dietary information funded by TiARA (Chef’s card and Mammalian Meat Allergy card). Allergy & Anaphylaxis Australia, with Maria, as CEO and a TiARA Committee member continues to receive calls from people from across the country with MMA. Many people who call the National Allergy Support line that is answered by health professionals directs people with suspected MMA to Prof Sheryl van Nunen as often, people have seen several health professionals without receiving an accurate diagnosis and therefore advice on avoidance and sometimes emergency care.

Janelle Williams (and Stefan, Blake and Remy Williams)

The website was designed, built and is hosted by the Williams family. Without the website

<https://www.tiara.org.au>

TiARA would have no tangible presence or repository for information regarding tick-induced allergies. This website is accessed by people from around the world as its

resources are unavailable otherwise to the vast majority of those with tick-induced allergies in other countries.

The PODCAST has been produced by Janelle and Remy Williams and this easily assimilated information, delivered in an entertaining manner as a professional media production, has been extraordinarily successful in reaching people around the world, scoring highly in media popularity surveys.

Janelle is also representing those with tick-induced allergies as a member of the Consumer Advisory Group for NACE.

31/-

Stephen Doggett, Director, Dept of Medical Entomology, NSW Health

Invaluable research has been conceived and done under Stephen's supervision documenting the tick species which bites humans in Australia as being *Ixodes holocyclus* (Australian paralysis tick), investigating the toxicity and persistence of permethrin-treated clothing, determining the effectiveness of topical and spatial repellents against *Ixodes holocyclus* and establishing that ultrasonic devices are ineffective in repelling ticks. Stephen has also taught the NACE PhD Scholar how to collect ticks for research.

A/Professor Andy Ratchford, Director of Emergency Medicine, Northern Beaches Hospital

Andy has collaborated with Prof Peter Irwin on the "Troublesome Ticks" research into infectious agents in ticks that have bitten humans. The work proving the effectiveness of tick killing *in situ* was performed in the Department of Emergency Medicine at Mona Vale Hospital, largely by the Emergency Physician-in-training at the time, Dr Benjamin Taylor. Andy has also been a co-supervisor of the Macquarie MD project medical students, who have examined data regarding mammalian meat allergy after tick bite patients (Prof Van Nunen's database).

Kevin Broady (A/Prof ret. UTS, Sydney)

Kevin has contributed insights into the seminal work on ticks done by him and his higher degree students when he was at UTS, has advised the NACE PhD student regarding the approach to defining the allergens operative in tick anaphylaxis and continues to share his knowledge of the science in tick allergy and the likely allergens and the mechanism of the tick triggering the switch to IgE (allergy antibody) production.

Paul Canfield AM (Previous Dean of Veterinary Science, The University of Sydney)

Paul has co-written and produced several papers which have informed the veterinarians of the evidence-based approach to tick bite management in humans (many humans ask their vet for advice when they take their companion animal for review) via the Veterinary Practitioners Board and the Continuing Education Program for veterinarians and educating the veterinarians regarding the tick-induced allergy conditions.

32/-

Dr Stephen Ginsborg

Stephen has represented TiARA in the Local Health District Networks and at the council and with his local member, disseminating knowledge and propagating our advice through these networks.

Melanie Burk RN

Melanie has been the clinical research nurse for TiARA from its inception. Her salary has been funded by Professor van Nunen's staff specialist trust fund and her private practice. Melanie's contribution to the Garvan study was only exceeded in commitment by her painstaking data entry to build the database, the interrogation of which has provided the Macquarie University MD students with the wherewithal to produce their work. Melanie has also organised many TiARA functions, analysed the website data, minuted the TiARA Committee meetings and worked hard taking the tick bite prevention and management advice to the community and the health professionals, on the Northern Beaches and in Gloucester, NSW. The hours Melanie has given to TiARA as a volunteer have been long, very much appreciated and vastly in excess of those hours for which she received a salary.

The enthusiasm and commitment of the four Macquarie University medical students over 2 years in all has been fruitful for them and for those with tick-induced allergies. They have presented their work in 2023 at the Annual ASCIA Conference and their four short papers have been published. They have educated all of their cohort and the clinical academic staff at Macquarie University in the tick-induced allergies when presenting their final work and are now poised to publish their final research papers in internationally recognised medical



journals.

Professor Sheryl van Nunen OAM FRSN

Sheryl first described mammalian meat allergy after tick bite in 2007. She convened TiARA in 2013, documented the first proven IgE-mediated mechanism in anaphylaxis to a food (mammalian meat) in systemic mastocytosis, first described ticks as an insect causing anaphylaxis in systemic mastocytosis and documenting alpha gal specific IgE presence in tick anaphylaxis. Her other contributions are detailed above.

33/-

TiARA has been supported and encouraged throughout by the Australasian Society of Clinical Immunology & Allergy (ASCIA), CEO Ms Jill Smith, and previous President, Dr Ray Mullins, with the correct advice regarding killing the tick *in situ* by freezing it being published on the ASCIA website in 2013. It is noted that the Australian Government of Health did not publish this advice until November, 2022, despite TiARA Committee members informing them repeatedly of the advisability of doing so from 2013. ASCIA Dietitian, Louise Perkins, has kindly helped develop useful FAQs.

TiARA has worked closely with Allergy & Anaphylaxis Australia since its inception and Maria's wise advice regarding how to best convey our messages to the community have been crucial in them being effective.

The support of Rotary International clubs (Chatswood and Ku-ring-gai) has been generous, timely and has disseminated knowledge in their communities. Rotary has twice funded the printing of the information pamphlets published by TiARA and distributed them to local pharmacies.

The National Allergy Centre of Excellence (NACE) has supported TiARA enormously over the last 3 years, enabling research into tick anaphylaxis and mammalian meat allergy with the funding of the NACE PhD Scholar, Hong kai Tan, at UNSW. This has already produced important information showing that alpha gal is indeed present in our *Ixodes holocyclus* tick.

Many people with tick-induced allergies have kindly given blood samples for research purposes. We thank them and appreciate their generosity with their time, for their insights into their tick-induced allergy and for their precious blood.

We thank Dr Karl Baumgart, Douglass Hanly Moir Pathology, for being the first to bring the Alpha gal specific IgE test to Australia and for their work in our joint research, both current and that over many years.

We thank Australian Red Cross Lifeblood for their support in our research too.



***Ixodes holocyclus* (Australian Paralysis Tick)** (common name)

Photograph: Stephen Doggett



