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Sullivan Nicolaides PATHOLOGY
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Mammalian meat allergy – an emerging threat at the barbeque

Key points:

- Mammalian meat allergy is an emergent allergy that has become increasingly prevalent worldwide, but particularly in Australia.
- Allergic reaction is the result of sensitisation to the carbohydrate galactose-α-1,3-galactose or alpha-gal, found in mammalian meat or meat products such as cow's milk and gelatine.
- Symptoms occur typically in about 3–6 hours after ingestion. They include abdominal pain and in some cases, anaphylaxis.
- Diagnosis is based on the history of the reaction and testing with a single recombinant allergen (alpha-gal) or a RAST MMA panel (alpha-gal, beef, lamb, pork).

First described in 2007, by Professor Sheryl van Nunen working in an allergy practice in Sydney, mammalian meat allergy (MMA) usually occurs in Australia as a reaction to bites from *Ixodes holocyclus* the Australian paralysis tick, which is endemic along the east coast and hinterland. 'Hot spots' include Sydney, the Sunshine Coast and the South Coast of NSW. The tick season is often considered to range from July to December, but the risk of exposure to ticks exists throughout the year.

Allergic reactions to tick bites may manifest as local reactions at the site of the bite and recurrent angioedema. However, they can also provoke anaphylaxis, or gut symptoms such as abdominal pain, diarrhoea and nausea after the consumption of mammalian meat – typically after a delay of 3–6 hours.

Mammalian meat allergy is a reaction mediated by IgE antibodies directed against a carbohydrate moiety alpha-gal (galactose-α-1,3-galactose) commonly expressed on non-primate mammalian proteins and present in all mammals other than humans, great apes and Old World monkeys. It is therefore present in all red meat eaten by humans and in mammalian meat products such as cow's milk and gelatine. The delay in reaction is due to factors modulating the uptake of alpha-gal from the gut. Fewer than 10% of patients who are allergic to mammalian meat also react to mammalian gelatine.

Anaphylaxis

Anaphylaxis is becoming more commonly seen in Australia, although it is uncommon elsewhere in the world. It is usually severe and may be fatal. There have been four deaths from tick-induced anaphylaxis in Australia. Older Australians (>50) are at greater risk. It is only seen with bites from adult ticks and it may occur when the tick is disturbed or removed inappropriately. It is very unlikely to occur if the tick is killed in situ.

Diagnosis

Diagnosis can be made by the presence of specific IgE to beef, pork, lamb, and milk, and the lack of IgE to chicken, turkey, and fish.

The diagnosis of mammalian meat allergy is often complicated by the time delay between exposure to meat and the onset of symptoms – which is unlike other food allergens. In addition, there are aggravating factors such as the amount ingested, method of cooking, use of spices, and being unwell. Co-factors such as alcohol consumption and non-steroidal anti-inflammatory agents also make the initial diagnosis challenging.

Testing at Sullivan Nicolaides Pathology

RAST or radioallergosorbent testing is performed for the diagnosis of MMA either as a single recombinant allergen specific to alpha-gal, or as a RAST MMA panel (alpha-gal, beef, lamb, pork).

Some patients may test positive to individual meats but detection of alpha-gal is required for an MMA diagnosis.

Management

Management of the condition includes avoidance of mammalian meat and meat products when MMA is severe. The help of a dietician may be required. This includes avoidance of beef, lamb/mutton, pork, goat, horse meat, kangaroo, venison, gravies, certain soups, stocks and sauces, rennet-containing cheeses and certain flavourings. In the small number of patients who are also allergic to cow's milk and gelatine, expert help may also be needed to identify hidden sources such as in jellies, lollies, thickened gelatine desserts such as mousse, some yoghurts and certain pharmaceutical products.

Alpha-gal can be found in a variety of drugs, so for those who are sensitised, this poses a risk of reaction. The best-known drug containing alpha-gal is cetuximab. It is also present in the gelatine used in capsules and suppositories, in porcine heart valves, and in some vaccines and anti-venoms.

Patients with anaphylaxis need to carry an Epipen.

What to order:	Alpha Gal Tbg Bovine RAST or RAST MMA panel
Collection:	Can be collected at any SNP collection centre
Sample:	1 x SST with a minimum 4 mL of blood
Transport:	Ambient temperature
Costs:	Alpha-gal is a recombinant allergen and attracts a complex test fee after a Medicare rebate. Beef, lamb and pork are standard individual allergens and can be bulk billed.

Further information and help contact:
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Dr Carl Kennedy MBBS FRACP FRCPA

Dr Kennedy works in both laboratory and clinical practice in allergy management and diagnosis in Brisbane and Toowoomba. A graduate of The University of Queensland, he trained in clinical immunology and allergy at the Royal Brisbane and Women's Hospital and the Princess Alexandra Hospital. He has a special interest in improving awareness of allergy for the general community.

Look out for our two new brochures on allergy testing. Our clinicians' *Guide to allergy testing* sets out our testing menu and covers the interpretation of tests. Our *Information for patients* provides a comprehensive plain language overview of allergies and testing.

To order, contact your Medical Liaison Manager on 1300 767 284.

References
Tick-induced allergies: mammalian meat allergy and tick anaphylaxis 2018. Sheryl A Nunen10.5694/mja17.00591Medical Journal of Australia

Sullivan Nicolaides PATHOLOGY

Quality is in our DNA

Say hello to the Brave Bunch – the heroes of our new website for kids!

Having a test can be daunting, especially if you're a kid.

That's why we've launched a new 'kids' corner' on our website to help our youngest patients prepare for their tests. Front and centre are the Brave Bunch, a group of Aussie animals – small but powerful, furry and feathery heroes who like nothing better than to help kids be brave.

Our collection centres specialising in paediatric testing are friendly, caring places where collectors are used to welcoming children and dispelling fears. Kids who have a test are given a special blue teddy and a pack that contains an awesome activity book packed with games and puzzles, plus pencils and bag tags. They feature Emmett the emu, Koko the koala, Waffles the wombat, Cookie the kookaburra, Booma the joey kangaroo, Petunia the platypus and last but by no means least, Possum.

We have also produced two kid-friendly videos to help parents explain what will happen when a child has a test. The videos show Harry aged nine going with his mum to a collection centre where he meets his collector and has his test. Along the way he finds himself bumping into members of the Brave Bunch.

These videos help families prepare their kids by giving them an opportunity to talk about what is going to happen. They can be viewed on a phone, tablet or desktop at a time when the child is most relaxed and receptive.

We'd be delighted if you have the time to explore our new Kids' Corner. Tell us what you think. Share it with your patients and colleagues. In this way we can keep improving the services we offer.

Click on https://www.snp.com.au/patients/kids-corner/

Small dense LDL-C: a new lipid reporting parameter now available

Dr Gemma Daley MBBS(Hons 1st Class) MBA MAACB

A novel parameter

LDL-C (low density lipoprotein cholesterol) is composed of different subclasses of particles with different densities and sizes.

The most atherogenic of the LDL subfractions is small dense lipoprotein cholesterol (sdLDL-C) that can be used to further characterise and define an individual's lipid status beyond traditional parameters. sdLDL-C can be used to predict a patient's incident coronary heart disease (CHD) survival (see Figure 1).

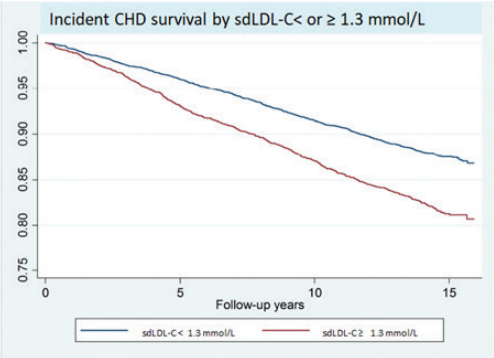

Figure 1: Kaplan-Meier survival curve for incident CHD survival and sdLDL-C < or ≥ 1.3 mmol/L 1

Small dense LDL cholesterol (sdLDL-C) circulates in the blood for longer than larger LDL-C, making it more susceptible to oxidation and uptake by macrophages. These smaller lipid particles also bind more readily to proteoglycans on the arterial wall.

Two individuals with the same total LDL value can differ significantly in atherosclerotic cardiovascular disease risk based on their sdLDL concentration.

sdLDL-C is available at Sullivan Nicolaides Pathology for requesting.

Fees: There is no Medicare rebate for this test.

Turnaround time: You can expect your patient's result back within 3 days of the sample reaching our laboratory.

References

1. Hoogeveen RC, Gaubatz JW, Sun W, et al. Small dense low-density lipoprotein-cholesterol concentrations predict risk for coronary heart disease: the Atherosclerosis Risk in Communities (ARIC) study. Arterioscler Thomb Vasc Biol. 2014 May;34(5):1069-77.
2. Gerber PA, Nikolic D, Rizzo M. Small, dense LDL: an update. Curr Opin Cardiol. 2017 Jul;32(4):454-459.

Three-gene reproductive carrier screen panel update: changes to testing male patients

Cystic fibrosis (CF), spinal muscular atrophy (SMA) and fragile X syndrome (FXS) are three of the most common familial disorders in Australia affecting one in 1,500 babies. Many people have no family history and are unaware they are carriers.

Our three-gene carrier screen panel can identify individuals or couples at high risk of having a child with one of these serious heritable disorders. Please note that changes have been made to the way males are tested.

- We now provide free male partner testing for an inherited gene that their partner carries.
- Males are no longer routinely screened for fragile X syndrome due to it being clinically diagnosed prior to reproductive age.

New brochures

We have also updated our *Information for Doctors* and *Patient Information* brochures. To order, please contact your Medical Liaison Manager on 1300 767 284.

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