CARDIOVASCULAR DISEASE (CVD)
Tomato/Tomato-based foods and Disease Risk

CVD - main findings

- The data suggest a protective relationship between the intake of tomato/tomato-based foods and heart disease through its effects on oxidative stress parameters (main test for Ox stress was LDL ox. susceptibility). The data warrants further evaluation of the relationship between tomato/ tomato-based foods and risk for heart disease.
- Recent updates include information on lipids, intima medial thickness, blood pressure, inflammation and oxidation endpoints.
- Significant effects relative to HDL, showing increases in HDL with tomato consumption (3 studies, see below)
- One PC study suggests increased vascular risk based on elevation of pro-thrombotic factors in the blood. These data require follow up.

Summary of studies and outcomes

- Number of studies = 47
- Risk estimates (RE) = 66
    - (-) = 39
    - N = 24
    - (+) = 3
- Risk estimates by Tomato or Lycopene category
    - √GT G. Tom = 12 (-), 6 (N), 3 (+)
    - √PT P. Tom = 22 (-), 15 (N)
    - √FT F. Tom = 3 (-)
    - √Lyco Lyco = 2 (-), 3 (N)

Summary Considerations/Notes:

- Studies varied in type with the greatest representation by intervention (baseline control/ no placebo) studies; however several RCT were added this update.
- Sample size considerations:
    - Of the 21 intervention studies investigating effects of tomato/tomato-based foods on lipids, oxidative stress, endothelial function, blood pressure and or inflammation endpoints;
        - 11 studies n= ≤ 19 subjects
        - 7 studies n= 20-40 subjects
        - 3 studies n= 60-100 subjects
    - Of the 17 RCTs investigating effects of tomato/tomato-based foods on lipids, oxidative stress, endothelial function, blood pressure and or inflammation endpoints;
        - 4 studies n= 10, n=10, n=21, n=64 (non-disease subjects) – Ox
        - 5 studies n=10, n=24, n=21, n=30, n=65 (non-disease subjects) – Ox,
        - Lipids
        - 4 studies n=103, n= 22, n=22, n=22 (non-disease subjects) – Ox, inflammation, endothelial function (n=22 may be the same subjects)
        - 1 study n= 39 subjects (smokers) - Ox
        - 1 study n= 57, ~14/treatment group (DM subjects) – Ox
        - 1 study n= 24 – TC and CRP
- Study duration:
    - Varied between single dose/1 day (1 study) to 2 months (1 study).
    - Typical study duration for intervention and RCT studies was 2-3 weeks with a 1-2 week run-in preceding intervention.

Table: Relationship between Tomato and Tomato-based foods and CVD

Study Type	N= studies	NEGATIVE ASSOCIATION (protective)					NEUTRAL ASSOCIATION (no associated risk or benefit)					POSTIVE ASSOCIATION (risk factor)				
CVD		Sample size, n=					Sample size, n=					Sample size, n=				
		≤100	101-200	201-500	501-1000	≥1000	≤100	101-200	201-500	501-1000	≥1000	≤100	101-200	201-500	501-1000	≥1000
RCT	17	$\surd_{PT}$ $\surd^{\#}_{PT}$ $\surd^{\#}_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd^{\#}_{PT}$ $\surd_{PT}$ $\surd_{GT}$ $\surd^{*}_{PT}$ $\surd^{*}_{FT}$ $\surd_{PT}$ $\surd_{PT}$					$\surd_{PT}$ $\surd^{\#}_{PT}$ $\surd^{\#}_{PT}$ $\surd_{GT^*}$ $\surd_{PT}$ $\surd^{*}_{Lyc}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$	$\surd_{GT}$								
Interv	21	$\surd_{GT}$ $\surd^{\#}_{GT}$ $\surd^{\#}_{GT}$ $\surd^{\#}_{GT}$ $\surd^{\#}_{GT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{GT}$ $\surd_{GT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{FT}$ $\surd_{Lyc}$					$\surd_{PT}$ $\surd_{PT}$ $\surd^{\#}_{GT}$ $\surd_{GT}$ $\surd^{\#}_{GT}$ $\surd^{\#}_{GT}$ $\surd_{GT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{PT}$ $\surd_{Lyc}$									
PC	3				$\surd_{GT^*}$ $\surd_{PT^*}$					$\surd_{Lyc^*}$			$\surd_{GT}$		$\surd^{\beta}_{GT}$	
CC	2		$\surd_{GT}$		$\surd_{PT}$											
Cross Sec	4			$\surd^{?}_{GT}$ $\surd^{?}_{PT}$ $\surd^{?}_{FT}$ $\surd^{?}_{GT}$ $\surd^{?}_{Lyc}$												$\surd^{\beta}_{GT}$
Eco	0															

** RE from same study.*

$\surd^{?}_{GT}$, $\surd^{?}_{Lyc}$ *: CS study: Sample size not reported in abstract. Periodontal disease and CHF.*

$\surd^{?}_{FT}$ *: CS, Sample size not reported in abstract.*

$\surd^{\#}$ *: Indicates that some endpoints in study were neutral while others showed improvement for reduced risk for disease.*

$\surd^{GT^*}$ *: Indicates that tomatoes were part of overall vegetable intake (not exclusively tomato); however, serum lycopene* ↑.

$\surd^{\beta}_{GT}$: Indicates tomato part of dietary pattern (in PC study, tomato was included in 'poor' dietary pattern)