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## 1. Review Articles

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2. Cardiovascular System

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**Cardiovascular System**
### Cardiovascular System

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## 7. Joint Health

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Grimm T, Schäfer A, Högger P
Antioxidant activity and inhibition of matrix metalloproteinases by metabolites of maritime pine bark extract (Pycnogenol®).
## 8. Allergy & Asthma

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Pycnogenol® improvements in asthma management.  
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11. Cognitive Function

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17. Analytics, Bio-Availability & Metabolism

Ref. 372
The metabolites developing in humans after consumption of Pycnogenol® are actively internalised by red blood cells, leukocytes, endothelial cells and neurons via the GLUT1 transporter. The tissue-specific accumulation represents the common denominator for Pycnogenol principal modes of action, as related to inflammation control, endothelial function, and cognition benefits. Kurlbaum M, Mülek M, Högger P Facilitated Uptake of a Bioactive Metabolite of Maritime Pine Bark Extract (Pycnogenol®) into Human Erythrocytes. PLOS ONE 8(4): 1-10, 2013

Ref. 371

Ref. 353

Ref. 301
Pycnogenol® constituents are transported in the blood stream bound to albumin, whereas the metabolites are not associated to blood proteins. Kurlbaum M, Högger P Plasma protein binding of polyphenols from maritime pine bark extract (USP). J Pharm Biomed Anal 54: 127-132, 2011

Ref. 239

Ref. 197

Ref. 171
USP Monograph. Maritime Pine Extract – USP 34.1196-1197 The United States Pharmacopeia, United States Pharmacopeial Convention, Inc. official from May 1, 2011

Ref. 170
Ref. 137  Evidence of percutaneous absorption of Pycnogenol® in human skin.  
*In vitro* Percutaneous Absorption of Pine Bark Extract (Pycnogenol®) in Human Skin.  
*J Toxicol Cutaneous Ocul Toxicol* 23: 149-158, 2004

Ref. 060  CLINICAL STUDY: Bio-kinetics (absorption, metabolism and excretion) of Pycnogenol® in healthy human subjects has been demonstrated by studying the excretion pattern of ferulic acid (one of the components of Pycnogenol®).  
Ferulic acid excretion as a marker of consumption of a French maritime pine (Pinus maritima) bark extract.  

Ref. 058  CLINICAL STUDY: Pycnogenol®, its components and metabolites are bio-available in humans for more than 24 hours to exert their beneficial effects.  
Grosse-Düweler K, Rohdewald P  
Urinary metabolites of French maritime pine bark extract in humans.  
*Pharmazie* 55: 364-368, 2000

Ref. 040  Pycnogenol® is shown to be bioavailable based on its therapeutic effects *in vivo*: The prevention of platelet aggregation and the capillary sealing effect. Valerolactones as sulphates or glucuronides appear in the urine and they represent the active metabolites of Pycnogenol®.  
Rohdewald P  
Bioavailability and metabolism of Pycnogenol®.  
*Eur Bull Drug Res* 7: 5-7, 1999
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