What happens at the cellular level to the patient in shock?

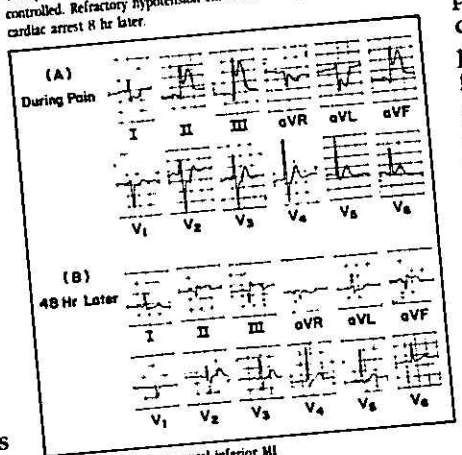
Pathophysiology of Shock, Anoxia, and Ischemia

Edited by **R ADAMS COWLEY, MD,** Director, Maryland Institute for Emergency Medical Services Systems (MIEMSS), and **BENJAMIN F. TRUMP, MD,** Director, Department of Pathology, University of Maryland School of Medicine; *with 74 distinguished international contributors*

If you can understand what happens in shock, you can come closer to controlling it. Your efforts to optimize the patient's physiological responses in life-threatening shock states are enhanced when you learn the underlying pathology and pathophysiology of these states.

What happens at the cellular level to the patient in shock? Why is the injury reversible at one point and later irreversible? Much of the answer lies in the changes which take place at the cellular level...the changes now documented in Cowley and Trump's new book. Superb electron micrographs, many taken at the very moment of cell death, clarify the effects of injury on cells and subcellular systems. Electron microscopy has been applied to the study of *freshly procured* human and animal tissues and fluids to give you some of the most remarkable pictures you've seen of the clumping, swelling, and breakdown that takes place in cells at various stages of injury.

This electron micrograph demonstrates severe subcellular injury with flocculent densities, the hallmark of cellular death. Following a motor vehicle accident this patient sustained a severe open head injury requiring craniectomy for decompression. Despite maximal operative methods and therapeutic coma, the cerebral intraventricular pressure could not be controlled. Refractory hypotension ensued and the patient suffered a cardiac arrest 8 hr later.



ECG changes of a transmural inferior MI

Chapters of special interest are the concise overviews of hemorrhagic and endotoxin shock... the body's response to sepsis...specific organ dysfunctions (hepatic, renal, exocrine pancreas, lung, GI tract) in shock...multiple systems failure... adult RDS treatment...current therapy of shock including transfusion therapy...treatment of septic shock... corticosteroid therapy...plasma expanders and hemodilution...hyperbaric oxygen therapy...CNS injury including pathophysiology of head injury...and vascular insufficiency.

This book is the result of a 10-year collaboration between a renowned cardiac surgeon — head of the now-famous Maryland Institute for Emergency Medical Services Systems that pioneered the "instant autopsy" in the country — and a well-known cellular pathologist. Contributions have come from 74 of the world's foremost physiologists, biochemists, and pathologists, including Sandritter, Linder berg, Mela, Carafoli, Reimer, Jennin Tyson, and Jane. To share in these exciting advances in the understand of shock states, reserve your copy f 20-day FREE TRIAL today.

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The first book to characterize shock states at the molecular and cellular level

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Edited by R. ADAMS COWLEY, MD
Director, Maryland Institute for
Emergency Medical Services System (MIEMSS)

BENJAMIN F. TRUMP, MD
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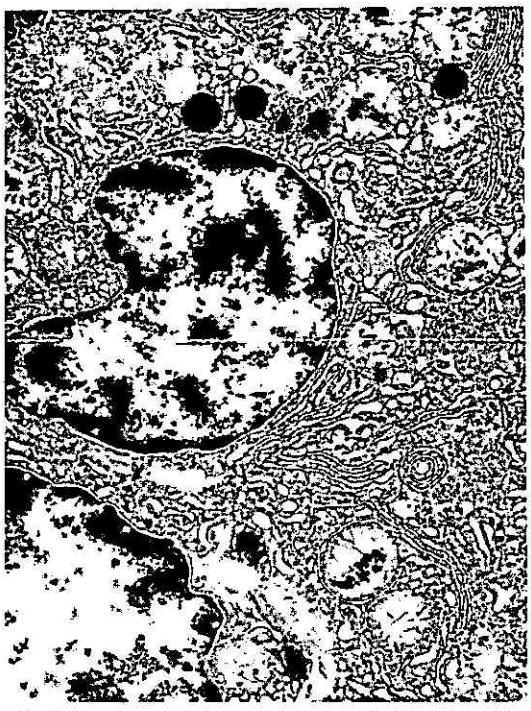
School of Medicine

Electron micrograph of liver obtained at autopsy from a 62-year-old male who suffered irreversible brain injury following self-inflicted gunshot wounds to the head. This patient had several shock episodes. Note the numerous residual bodies.



This electron micrograph demonstrates severe subcellular injury with flocculent densities, the hallmark of cellular death. Following a motor vehicle accident this patient sustained a severe open head injury requiring craniectomy for decompression. Despite maximal operative methods and therapeutic coma, the cerebral intraventricular pressure could not be controlled. Refractory hypotension ensued and the patient suffered a cardiac arrest 8 hr later.

The first comprehensive approach to the pathophysiology and treatment of shock, anoxia, and ischemia

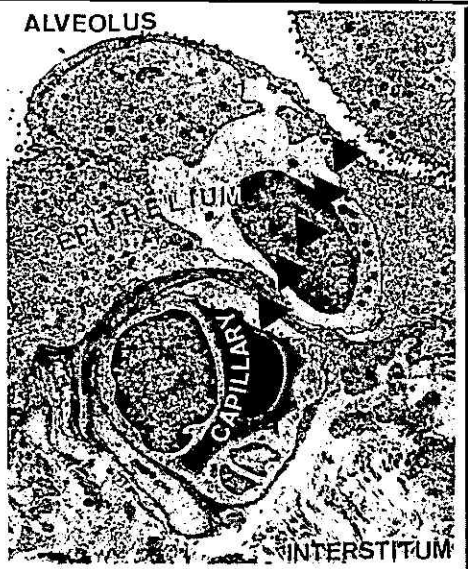
An interdisciplinary group of pathologists, biochemists, and physiologists collaborate to show that it is now possible to characterize anoxic and other ischemic states (including shock, myocardial infarction, stroke, and CNS injury) at the molecular level. The book brings you much new information on both mechanisms of injury and therapeutic interventions. Many of the remarkable findings reported here can be traced to the Maryland group's access to "instant autopsy," which has brought quantum leaps in understanding the pathophysiology of shock. Because this group has had the unique advantage of being able to study the trauma victim at the very moment of death, they have been able to apply advanced tools, such as electron microscopy, to the study of freshly procured tissues and fluids.

You'll get in-depth analysis of ultrastructural, biochemical, and physiologic events which occur as a response to injury. New findings relating to structure and function are correlated with treatment at the cell level...and in all major organ systems.

Here is just a sampling of the chapters of special interest to pathologists:

- Trump, Berezsky, and Cowley's overview of cell and organelle reactions to injury in various disease processes, demonstrating that it is now possible to characterize both reversible and irreversible cell damage at the ultrastructural level
- Mela's important review on shock state changes in the mitochondria, which more than likely represent the primary site of damage
- Carafoli's excellent analysis of the regulation of cell calcium, a major messenger that mediates cell damage
- Chapters by Reimer and Jennings on altered cell volume regulation, correlated with changes in cyclic nucleotides

- Documentation of progress in the study of microcirculation through McCusky's intraviral microscopy and other methods
- Al Lefer's important review of major vascular mediators, including the renin angiotensin system, prostacyclines, thrombozyme systems, and lysosomal hydrolases
- Changes in the liver in shock states reported by Cowley and Trump
- Changes in the lung reported by Sandritter's group in Freiburg
- Detailed chapter on altered pathophysiology in adult RDS
- Richard Lindenberg's comprehensive review of the pathology and Tyson and Jane's review of the pathophysiology of head injury
- Review of spinal cord injury
- A major review of subcellular pathology by Mergner and Schaper in the chapter on myocardial infarction
- Garcia considering the cell pathophysiology of stroke
- Roberts reviewing his extensive studies of coronary artery narrowing in fatal acute myocardial ischemia



Ultrastructure of human alveolar wall in the late stage of shock. The alveolar wall is diffusely thickened. Capillaries lie in a fibrosed and thickened interstitial space and have been forced away from the alveolar surface by the cuboidal epithelium. Because of this, gaseous exchange is impaired and compliance is reduced to a level which threatens the life of the patient. ×6,500.

Contents

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NEW!

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The first comprehensive approach to the physiology... pathology... pathophysiology... and therapy of anoxic and other ischemic states

sample illustration from Coagulation — The Essentials

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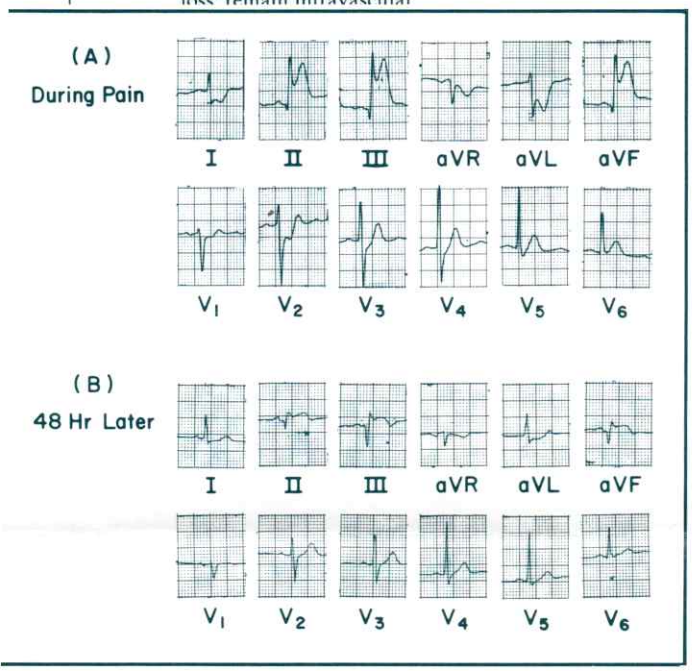
Table 29.2
Fluid Resuscitation in Hemorrhagic-Traumatic Shock

Agent	Advantages	Disadvantages
Crystalloids—adequate for early transient replacement of moderate plasma volume loss		
Dextrose/water	In renal failure	Hypo-osmolality, edema
5–10% dextrose/0.25–0.5% NaCl	Recommended for hydration	Too hypotonic for plasma replacement
0.9% NaCl	Inexpensive, isotonic	Lost into interstitial space (edema) and urine; needs three to five times volume lost; enhances tissue acidosis
5–10% dextrose[a]/lactated Ringer's (acid)	Inexpensive, composition like ECF	
5–10% dextrose[a]/buffered Ringer's (pH 7.4)	Theoretically ideal	
Colloids—needed for sustained replacement of severe plasma volume loss; remain intravascular		
Whole blood	Physiologic	High cost
Packed RBC	Reduces sedimentation, aggregation, inexpensive, long shelf life	Reduces clotting,[b] plugs renal tubules in shock and oligemia
Packed RBC, washed	Inexpensive, long shelf life	Reduces clotting[b]
Packed RBC, frozen	Inexpensive, long shelf life	Reduces clotting[b]
Fresh plasma	Physiologic	Hepatitis risk
Fresh blood	Clotting factors preserved	High cost, requires cross match
ne Hct		
Stored blood	Apparently physiologic	High cost, low availability, requires type-cross matching, hepatitis risk, hemolytic reaction risk, cold, acid, high K, low Ca, low platelets
Plasma protein fraction (5%)	Permits component therapy, more economic than whole blood	Same as whole blood, poor flow (viscous), needs dilution
Albumin (5%)	Most physiologic; normal pH, electrolytes	As stored blood, except clotting factors normal,
Albumin (25%)	Long shelf life, none of the disadvantages of blood, no cross match	Unphysiologic, storage and elimination unclear, still experimental, needs O_2 breathing
Dextran 70 (6%)	No crossmatch	Rapidly eliminated, metabolized, vasoactive, possible renal toxicity

ɹged according to blood sugar in protracted shock (keep BS 100–300 mg/100

All colloids except fresh blood and fresh plasma reduce clotting by dilution of vantageous in protracted shock without active bleeding.



ECG changes of a transmural inferior MI. *A*, marked ST segment elevation in II, III, and aVF during the early stages of myocardial ischemia. ST segment depression in I and aVL could be the reciprocal of ST segment elevation in the inferior leads or could result from primary subendocardial ischemia in the high lateral myocardium. *B*, 24 hr later the infarction has evolved with an increase in Q wave depth and a decrease in ST segment elevation in II, III, and aVF. Although its height has decreased, the R wave is still present, indicating persistence of some viable myocardium in that area. (From Pathophysiology of Shock, Anoxia, and Ischemia.)

The result of a 10-year collaboration between a renowned cardiac surgeon, head of the now famous Maryland Institute for Emergency Medical Services Systems (MIEMSS), and a well known cellular pathologist... with contributions from 74 of the world's foremost pathologists, biochemists, and physiologists

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"Instant autopsy" takes the Maryland group quantum leaps ahead in the understanding of shock states

Many of the remarkable findings reported here can be traced to the Maryland group's access to "instant autopsy." Because the Maryland shock/trauma unit is by court order able to study the trauma victim at the very moment of death, they have made quantum leaps in the understanding of the pathophysiology of shock.

Superb electron micrographs, many taken at the moment of cell death, clarify the effects of injury on cells and subcellular systems... and contribute to your understanding of just what happens to a patient in shock. Electron microscopy has been applied to the study of freshly procured human and animal tissues and fluids to give you some of the most remarkable pictures you've seen of the clumping, swelling, and breakdown that takes place in cells at various stages of injury.

Distinguished contributors from all over the world explain what is now known about shock... from the cellular level to the total body system

You first get a general understanding of cell injury and the body's metabolic response to that injury. The book covers the microcirculation as well as shock phenomena such as multiple systems failure, the body's response to sepsis, endotoxin shock, and systems toxicants. Each major dysfunction — liver, lung, GI tract, exocrine pancreas, CNS, and vascular insufficiency — is described in terms of pathology and physiology to give you a better understanding of the disintegration of body systems when shock is not controlled.

Here is just a sampling of the chapters of special interest to anesthesiologists and specialists in critical care medicine

- ... Webb & Brunswick's excellent clinical review of the microcirculation in shock
- ... Chaudry & Baue's overview of hemorrhagic shock
- ... Hinshaw's overview of endotoxin shock
- ... Valuable chapter on the body's response to sepsis
- ... Full section covering specific organ dysfunctions in shock... hepatic, renal, exocrine pancreas, lung, GI tract
- ... Valuable chapter on multiple systems failure
- ... Chapter on treatment of adult RDS
- ... Practical section on current therapy of shock, with separate chapters on transfusion therapy, treatment of septic shock, corticosteroid therapy, plasma expanders and hemodilution
- ... Chapter on hyperbaric oxygen therapy
- ... Section on CNS injury, including a chapter by Tyson & Jane on the pathophysiology of head injury
- ... Section on vascular insufficiency that thoroughly covers myocardial infarction and myocardial ischemia

January 1982/710 pages/335 illustrations/ $75.00 (#2149-4) *$90.00 outside the U.S.*

How to reserve your free trial copy:

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