
Bibliography of Hemorrhagic Fever with Renal Syndrome (Muroid Virus Nephropathy)

BIBLIOGRAPHY OF
HEMORRHAGIC FEVER WITH RENAL SYNDROME
(MUROID VIRUS NEPHROPATHY)

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Introduction

INTRODUCTION

The disease we review in this comprehensive bibliography of the world literature has been known to medicine for over a half century, but to the English-speaking world for only the past two decades. It has slowly been appreciated as a major zoonosis of the Eurasian landmass, and in the last few years as a potential problem in other continents. For 18 years after epidemic hemorrhagic fever suddenly became a major disease problem of the United Nations forces in South Korea during the Korean War--thus bringing the Chinese, Russian, and Japanese literature on the disease to the attention of Western medicine--the virus causing the disease could not be isolated or serologically identified. Since the isolation of the etiological agent of Korean hemorrhagic fever (KHF) by Ho-Wang Lee and Pyung-Woo Lee, it has become possible to identify hemorrhagic fever with renal syndrome (HFRS) of the Soviet Far East and the epidemic hemorrhagic fever (EHF) of China and the more-recently recognized disease in Japan with the Korean disease. It has also been possible to investigate previously-hypothesized relationships between nephropathia epidemica (NE) of Scandinavia, hemorrhagic fever with renal syndrome in the Balkan nations and Korean hemorrhagic fever. A virus of the HFRS group has now been isolated from wild rodents in the United States. In the past few years, it has become clear that urban rats in many parts of the world carry Hantaan virus as do laboratory-bred white rats in Japan and Belgium. It now appears likely that viruses of the KHF or Hantaan virus group will be recognized as a worldwide problem of human disease.

The literature on the disease has appeared in the scientific press in many areas of the world (including the Soviet Union, Japan, Korea, and China, as well as the Balkan area and Scandinavia), and is often difficult to locate and retrieve; thus, we have assembled this bibliography in order to facilitate research.

TERMINOLOGY

The viral hemorrhagic fevers are characterized by bleeding in a significant portion of patients. They are caused by a diverse array of RNA-containing viruses belonging to the flavivirus, arenavirus, nairovirus and Bunyamwera virus groups. Yellow fever, caused by a mosquito-borne flavivirus, although described

over a century ago, clearly belongs in the group of viral hemorrhagic fevers.

The disease which brought this designation and classification to Western European and American medicine was epidemic hemorrhagic fever, now called Korean hemorrhagic fever, and it is this disease and diseases caused by serologically related Bunyamwera-like viruses which we now call hemorrhagic fever with renal syndrome (HFRS). Since urban cases of HFRS (acquired from contact with commensal rats) in Korea and Japan and nephropathia epidemica of Scandinavia rarely show any bleeding phenomena, although they are caused by serologically closely related viruses, the term hemorrhagic fever used for these clinical entities is misleading. All known diseases caused by viruses related to the KHF virus (Hantaan virus) are characterized by a proteinuria and azotemia in most patients. The virus is carried to man by excretions and aerosols, probably from infected respiratory droplets, from healthy rodent carriers who excrete the virus from their lungs, in saliva, and in urine. All these unaffected rodent carriers belong to the suprafamily Muroidea and the genera Apodemus, Clethrionomys, Microtus and Rattus. Thus, I have, in consultations with Dr. Robert Traub, recently suggested the name muroid virus nephropathies to replace the name HFRS for all diseases caused by this newly defined group of viruses carried to man by healthy rodents of the suprafamily Muroidea and belonging to the families Muridae (genera Apodemus and Rattus) and Cricetidae (genera Clethrionomys and Microtus).

HISTORICAL BACKGROUND

"Hemorrhagic fever" was a term which came into general use in Western medicine only since the period of the Korean War when an infectious disease new to Western medicine, often accompanied by a bleeding syndrome, appeared among United Nations troops and was designated epidemic hemorrhagic fever. Subsequently, the Korean disease was often referred to as Korean hemorrhagic fever (KHF). During investigation of this new illness, Western physicians became aware of the existence of a whole group of hemorrhagic fevers which had been described in the Soviet Union during the previous decade, and which were usually distinguished by prefacing the term "hemorrhagic fever" with the geographic locality in which the syndromes were observed. Thus, Crimean hemorrhagic fever, Omsk hemorrhagic fever, Far Eastern hemorrhagic fever,

Uzbekistan hemorrhagic fever, Central Asian hemorrhagic fever, Yaroslav hemorrhagic fever, and numerous other such terms entered the medical literature. Subsequent investigation established that these designations encompass a number of distinct nosological entities; the viral etiological agent of each of these has been isolated. All are caused by RNA-containing viruses, but they belong to several different taxonomic groups. Unfortunately, the already ambiguous designation "hemorrhagic fever" was later applied to yet other distinct disease entities which were encountered in the Philippine Islands, Thailand, Singapore, Argentina, Bolivia, and elsewhere. To confuse matters further, the name "epidemic hemorrhagic fever," at first applied specifically to the Korean disease, was used by Index Medicus and other reference services to include a variety of other infections caused by viruses belonging to very different groups than that causing the Korean disease.

The simple designation "hemorrhagic fever" would best be applied to no single disease entity. Instead, it conveniently describes a syndrome, common to a number of diseases, the rule in some, and the rare exception in others. In many infections an increase in capillary permeability, associated often with small ruptures of capillaries, can produce petechiae and even more extensive cutaneous hemorrhages, and, should this phenomenon extend to other organs, petechial hemorrhages, or more severe extravasations of blood into the urinary or gastrointestinal tract, the endocrine and cardiorespiratory systems, the central nervous system, and other tissues of the body may occur. At times this syndrome may give rise to massive bleeding and produce symptoms of hemoptysis or hematemesis, hematuria or gastrointestinal bleeding, uterine hemorrhage, epistaxis, conjunctival hemorrhage, or ecchymoses. Thus, among the common infectious diseases, hemorrhagic syndromes, which could be properly designated hemorrhagic fever, may appear in typhoid fever, chickenpox, rubella, and measles, and are not uncommonly encountered in infectious mononucleosis and infectious hepatitis. Furthermore, all the viral and rickettsial diseases which have occasionally caused thrombocytopenia may lead to a hemorrhagic syndrome which might be so designated. The pathophysiology of the bleeding phenomena of the common infectious diseases of childhood and that of the hemorrhagic fevers are apparently in no way different: capillary changes and/or thrombocytopenia play a role in each. The diseases which have been called hemorrhagic fever per se, with appropriate geographic prefixes, have had, in general, a greater incidence of the hemorrhagic syndrome than is to be expected in the usual

exanthemas of childhood; however, even in the classical Omsk hemorrhagic fever or in epidemic KHF bleeding phenomena are not invariable and are only encountered in a portion of the cases. The best clinical physiological studies have been made on HFRS and on dengue hemorrhagic fever syndromes; even in these it has not been possible to demonstrate direct cytopathological effect of the viruses on capillary endothelium or on platelet-producing cells. In both of these diseases the increased capillary fragility is accompanied by leakage of protein-rich fluid from the vascular bed which leads to an acute shock syndrome, and yet the direct action of the virus on any cell groups has not been shown to cause these phenomena. It would be better to designate the symptom complex described above as the hemorrhagic syndrome and to restrict the use of the term "virus hemorrhagic fever" to those virus diseases in which the hemorrhagic syndrome attains a high incidence: of these, the earliest-defined and most widespread is epidemic hemorrhagic fever itself, now grouped under the term, "hemorrhagic fever with renal syndrome", or, as we now propose (in order to encompass its nonhemorrhagic form of low virulence), muroid virus nephropathy.

TRANSLITERATION

We have used a modified version of the U.S. Library of Congress transliteration system for citations in Russian wherever possible:

А А	К К	Х KH
Б Б	Л Л	Ц TS
В В	М М	Ч CH
Г Г	Н Н	Ш SH
Д Д	О О	Щ SHCH
Е Е	П П	Ъ "
Ё Ё	Р Р	Ы Y
Ж ZH	С S	Ь '
З Z	Т Т	Э E
И I	У U	Ю IU
Й I	Ф F	Я IA

Because so many systems are used in the scientific literature for romanizing Chinese, Japanese, and Korean characters, we were not always able to change citations into a consistent system when the original material was unavailable. When there was a choice, we preferred Pinyin for Chinese and Hepburn romanization for Japanese.

List of Synonyms

English (Note: the spellings "hemorrhagic" and "haemorrhagic" alternate)

Acute endemic hemorrhagic fever
Acute epidemic hemorrhagic fever
Acute hemorrhagic tubulointerstitial nephritis
Bosnian hemorrhagic fever
Churilov disease
Endemic benign nephropathy
Endemic hemorrhagic fever
Endemic hemorrhagic nephroso-nephritis
Epidemic hemorrhagic disease
Epidemic hemorrhagic fever
Epidemic hemorrhagic fever with renal syndrome
Epidemic nephritis
Epidemic nephropathy
Epidemic nephroso-nephritis
Epizootic hemorrhagic disease
Far Eastern hemorrhagic fever
Hemorrhagic fever
Hemorrhagic fever with renal syndrome
Hemorrhagic nephroso-nephritis
Infectious hemorrhagic fever
Korean hemorrhagic fever
Muroid virus nephropathy
Nephropathia epidemica
Nephropathia epidemica Myhrman
Nephropathia epidemica Myhrman-Zetterholm
Nephroso-nephritis haemorrhagica
Rodent-borne viral nephropathy
Scandinavian epidemic nephropathy
Songo fever
Tickborne hemorrhagic fever
Viral hemorrhagic fever
Viral nephritis
Virus hemorrhagic fever

Russian

Bolezn' Churilova [Churilova disease]
Dal'nevostochnaia gemorragicheskaiia likhoradka [Far Eastern hemorrhagic fever]
Dal'nevostochnaia gemorragicheskaiia likhoradka s pochechnym sindromom [Far Eastern hemorrhagic fever with renal syndrome]
Del'nevostochnaia skarlatinopodobnaia likhoradka [Far Eastern scarlatiniform fever]
Dal'nevostochnyi nefrozo-nefrit [Far Eastern nephroso-nephritis]
Endemicheskii gemorragicheskii nefrozo-nefrit [Endemic hemorrhagic nephroso-nephritis]
Endemicheskii nefrozo-nefrit [Endemic nephroso-nephritis]
Epidemicheskaiia gemorragicheskaiia likhoradka s pochechnym sindromom [Epidemic hemorrhagic fever with renal syndrome]
Epidemicheskii gemorragicheskii nefrozo-nefrit [Epidemic hemorrhagic nephroso-nephritis]
Gemorragicheskaiia likhoradka s pochechnym sindromom [Hemorrhagic fever with renal syndrome]
Gemorragicheskii nefrozo-nefrit [Hemorrhagic nephroso-nephritis]
Infektsionnyi gemorragicheskii nefrozo-nefrit [Infectious hemorrhagic nephroso-nephritis]
Infektsionnyi nefrozo-nefrit [Infectious nephroso-nephritis]
Nefrozo-nefrit [Nephroso-nephritis]
Ostryi infektsionnyi nefrozo-nefrit [Acute infectious nephroso-nephritis]
Tul'skaia likhoradka [Tula fever]
Ural'skaia gemorragicheskaiia likhoradka [Ural hemorrhagic fever]
Yaroslavskaiia gemorragicheskaiia likhoradka [Yaroslav hemorrhagic fever]

Japanese

[Endemic hemorrhagic fever]
[Epidemic nephritis]
[Erhtaokiang disease]
Febris haemorrhagica epidemica
Febris haemorrhagica infectioza
[Heiho fever]
[Kokuko fever]
[Kokko fever]
[Korin fever]
[Manchurian epidemic hemorrhagic fever]
[Nidoko disease]
[Nidoko fever]
Purpura haemorrhagica epidemica
Ryukosei shukketsu netsu [Epidemic hemorrhagic fever]
Songo netsu [Songo fever]
[Sunwu fever]
[Tayinshan disease]

Bulgarian

Endemichnii nefrit [Endemic nephritis]
Hemoragichen nefrozo-nefrit [Hemorrhagic nephroso-nephritis]
Hemaragichnaia nefrozo-nefrita [Hemorrhagic nephroso-nephritis]
Hemoragichnaia treska s bobrechen sindrom [Hemorrhagic fever with renal syndrome]
Hemoragicniga nefrozo-nefrit [Hemorrhagic nephroso-nephritis]
Hemoragicnij nefrozo-nefrit [Hemorrhagic nephroso-nephritis]
Infektsionnykh nefrozok-nefritakh [Infectious nephroso-nephritis]
Khemoragichni treski [Hemorrhagic fever]
Virusnite khemoragichni treski [Viral hemorrhagic fever]

Chinese

Liu xing xing chu xue re [Epidemic hemorrhagic fever]

Czechoslovakian

Hemoragická nefroso-nephritis [Hemorrhagic nephroso-nephritis]
Hemoragická nefrozo-nephritida [Hemorrhagic nephroso-nephritis]
Hemoragické nefroso-nephritidy [Hemorrhagic nephroso-nephritis]
Hemoragické horůcky s renálním syndromem [Hemorrhagic fever with renal syndrome]
Hemoragické horečky [Hemorrhagic fever]
Vojnová nefritis [War nephritis]

Danish

Atypisk akut nephritis [Atypical acute nephritis]
Nephritis
Nephropathia epidemica
Nephropathia epidemica Myhrman

Dutch

Oorlogs-nephritis [War nephritis]

Finnish

[Acute nephritis]
Epideemin nefropatia [Epidemic nephropathy]
Epidemisk nefropati [Epidemic nephropathy]
Fäلتfeber
[Fennoscandinavian rodent fever]
Myyräkuume [Vole fever]
Nephropathia epidemica Myhrman
Nephropathia epidemica

French

La fièvre hémorragique épidémique [Epidemic hemorrhagic fever]
La fièvre hémorragique à syndrome rénal [Hemorrhagic fever with renal syndrome]

German

Akute hämorrhagische Nephroso-Nephritis [Acute hemorrhagic nephroso-nephritis]
Akuter Nephrose [Acute nephrosis]
Epidemisches hämorrhagisches Fieber [Epidemic hemorrhagic fever]
Hämorrhagischen Fieber [The hemorrhagic fevers]
Epidemisches hämorrhagisches Fieber mit renalem Syndrom [Epidemic hemorrhagic fever with renal syndrome]
Febris haemorrhagica
Hämorrhagisches epidemisches Fieber [Hemorrhagic epidemic fever]
Hämorrhagisches Fieber mit renalem Syndrom [Hemorrhagic fever with renal syndrome]
Hämorrhagische Nefroso-Nephritis [Hemorrhagic nefroso-nephritis]
Kryptogena akute nefritier [Cryptogenic acute nephritis]
Nephroso-nephritis
Schlammfieberähnliche Krankheit [Swamp fever-like illness]

Hungarian

Endémiás nephropathia [Endemic nephropathy]
Haemorrhagias laz [Hemorrhagic fever]
Haemorrhagiás nephroso-nephritis [Hemorrhagic nephroso-nephritis]
[Hemorrhagic fever with renal syndrome]
[Hemorrhagic nephroso-nephritis]
Haemorrhagiás lás járványtana [Hemorrhagic fever with renal syndrome]
Nephroso-nephritis
Nephroso-nephritis haemorrhagica [Hemorrhagic nephroso-nephritis]
Nephroso-nephritis haemorrhagica infectiosa [Infectious hemorrhagic nephroso-nephritis]
Sporadicus nephroso-nephritis haemorrhagica infectiosa [Sporadic infectious hemorrhagic nephroso-nephritis]

Italian

Febbre epidemica emorragica [Epidemic hemorrhagic fever]
Febbre emorragica epidemica [Epidemic hemorrhagic fever]

Korean

[Endemic hemorrhagic fever]
Han-Kook-Hyung Chool-Heul-Leul [Korean hemorrhagic fever]
[Hantaan virus fever]
[Korean epidemic hemorrhagic fever]
Yu-Hang-Sung Chool-Heul-Leul [Epidemic hemorrhagic fever]

Norwegian

Nephropathia epidemica

Polish

Nephroso-nephritis haemorrhagica

Rumanian

Endemias nephropathia [Endemic nephropathy]
Endemske nefropatiје [Endemic nephropathy]
[Epidemic nephropathy]
Nephropathia epidemica
Nefropathia epidemica Myhrman

Serbo-Croatian

[Chronic endemic nephropathy]
Endemskaja nefropatija [Endemic nephropathy]
Epidemija hemoragiene groznice [Epidemic hemorrhagic fever]
Epidemija hemoragiene groznice s renalnim sindromom [Epidemic hemorrhagic fever
with renal syndrome]
Epidemiji hemoragicne groznice [Epidemic hemorrhagic fever]
Epidemijska hemoragijska groznica [Epidemic hemorrhagic fever]
Epidemiska hemoragicna groznica [Epidemic hemorrhagic fever]
Hemoragichen nefrozonefrit [Hemorrhagic nephroso-nephritis]
Hemoragicka groznica [Hemorrhagic fever]
Hemoragicna groznica [Hemorrhagic fever]
Hemoragicna groznica s renalnim sindromom [Hemorrhagic fever with renal
syndrome]
Hemoragicka vrucica s renalnim sindromom [Hemorrhagic virus with renal
syndrome]
Hemoragijske groznice [Hemorrhagic fever]
[Yugoslavian nephritis]

Spanish

Fiebre hemorragica [Hemorrhagic fever]
O mal de los rastros
Viroses hemorragica [Hemorrhagic virus]

Swedish

Akuta nefriter [Acute nephritis]
[Endemic benign nephropathy]
[Epidemic nephritis]
[Epidemic nephropathy]
Epidemisk nephrit
Febris epidemica haemorrhagica
Kryptogena akuta nefriter [Cryptogenic acute nephritis]
Nephropathia endemica
Nephropathia epidemica
Nephropathia epidemica Myhrman
Njurjukdom [Renal disease]

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