cardiopulmonary bypass (26). While powders of nitrite salts are present on almost every laboratory bench in the world, and nitrite anion preparations are currently available for human infusion in cyanide antidote kits, further clinical work is needed to address the safety and efficacy of this agent for the treatment of specific human diseases. At the very least, perhaps we should avoid mouthwash and feel slightly less guilty about eating hot dogs at the ball park.

that in culture, KSHV does provide these cells with a selective advantage.

**A possible contribution of the lytic cycle to oncogenesis**

Grundhoff and Ganem propose that the rapid loss of KSHV from infected cells that they have observed in vitro likely occurs in endothelial cells in vivo and may be one reason for the frequent productive infection observed in spindle cells within KS lesions: new viruses would be required to recruit newly infected cells to the lesion (1). This proposition is consistent with the recent work of Ciufò et al. (3), who have found that KSHV infection of primary dermal microvascular endothelial cells yielded mixtures of latently infected spindle-shaped cells and small populations of productively infected cells (3). The virus released by the latter population was able to infect freshly added endothelial cells in order to maintain the mixed infected population (Figure 1). Other features of productive infection are also likely to contribute to KS. Viral genes thought not to be expressed during latent infection, based on analyses of KSHV-positive lymphoma cells, may be pivotal for the proliferation of KSHV-infected endothelial cells. KSHV G protein–coupled receptor (vGPCR), which is expressed early in productive infection, is one such viral gene. By itself, vGPCR can immortalize human primary endothelial cells and induce KS-like lesions in a mouse (4, 5).

A traditional hallmark of herpesviruses has been their latent infection, a relationship between the virus and host cell in which infected cells survive and the virus persists with little expression of its genes and without the production of progeny virus. The generality of this paradigm may be waning as the relationships between new herpesviruses and host cells are elucidated. Analysis of KSHV infection of endothelial cells has indicated that these cells may transition readily from latent to productive infection and that these transitions likely contribute to the pathogenesis of KS.


East meets West: an herbal tea finds a receptor

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Jaundice, which is caused by accumulation of bilirubin, is extremely common in newborn infants. Phototherapy is an effective treatment, but a drug therapy would also be desirable. A Chinese herbal remedy for jaundice called Yin Zhi Huang is now shown to activate a liver receptor that enhances the clearance of bilirubin (see the related article beginning on page 137). This discovery could lead to improved pharmaceutical treatments for neonatal jaundice.


Advances in Western medicine have dramatically increased health and life expectancy (1). Nevertheless, over $4 billion is spent per year on herbal remedies that are complementary or alternative to Western-style care (2). Prescription medicines are usually purified molecules whose biological target is established and whose efficacy is endorsed by regulatory agencies. By contrast, herbal medicines often contain many ingredients whose effects on biochemical pathways are unknown and whose efficacy is proven in controlled studies. A report in the current issue of the JCI helps to bridge this gap. David Moore and colleagues (3) show the improvement of jaundice by a Chinese herbal tea called Yin Zhi Huang (YZH), “boiled down” to one component that regulates the activity of a nuclear receptor previously implicated in bilirubin clearance (4, 5). This discovery provides a mechanistic ration-

ale for pursuing an ingredient in YZH as a lead to improve upon the standard Western treatment for fetal jaundice.

While there’s tea, there’s hope.
—Sir Arthur Pinero

Herbal remedies are often produced in the form of tea, that is, a decoction of dried plant leaves in boiling water. In today’s Western world, teas serve as beverages for enjoyment as well as for herbal therapies. The former use has widespread acceptance, whereas the therapeutic use of tea is not espoused by mainstream Western medicine, largely because Western pharmacology has focused on purified chemical compounds, with defined mechanisms of action, whose effectiveness has been proven in controlled studies. By contrast, most teas used for medicinal purposes are admixtures of phytoc hemicals whose efficacy and biological target(s) are unproven by Western standards. This can threaten relationships between physicians guided by the Western medical literature and millions of their patients who opt to use teas preventively or therapeutically for cancer, inflammatory disease, and metabolic disease (6). At the same time, Eastern remedies may contain critical clues for disorders that have been refractory to Western medicine.

Table 1

Components of herbal remedies that target nuclear receptors

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Indication</th>
<th>Compound</th>
<th>Receptor</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhei rhizoma</td>
<td>Prostate cancer</td>
<td>Lindleyin</td>
<td>ER</td>
<td>17</td>
</tr>
<tr>
<td>Ginseng</td>
<td>Stress</td>
<td>Ginsenoside-Rg1</td>
<td>ER</td>
<td>18</td>
</tr>
<tr>
<td>Grapeseed/red wine</td>
<td>Cardiovascular</td>
<td>Resveratrol</td>
<td>ER</td>
<td>9</td>
</tr>
<tr>
<td>Scutellaria baicalensis</td>
<td>Prostate cancer</td>
<td>Bacalain</td>
<td>AR</td>
<td>19</td>
</tr>
<tr>
<td>Dioscorea villosa</td>
<td>Menopause</td>
<td>Diosgenin</td>
<td>PR</td>
<td>20</td>
</tr>
<tr>
<td>Longmu Zhuanggu Chongji</td>
<td>Rickets</td>
<td>Vitamin D2</td>
<td>VDR</td>
<td>21</td>
</tr>
<tr>
<td>Xiao Chi Hu Tang</td>
<td>Leukemia</td>
<td>Retinoic acid</td>
<td>RAR</td>
<td>22</td>
</tr>
<tr>
<td>Guggul tree resin</td>
<td>Lipid disorder</td>
<td>Guggulsterone</td>
<td>FXR</td>
<td>23</td>
</tr>
<tr>
<td>Pseudolarix kaempferi</td>
<td>Fungal infection</td>
<td>Pseudolaric acid B</td>
<td>PPARx</td>
<td>24</td>
</tr>
<tr>
<td>Hypericum perforatum</td>
<td>Depression</td>
<td>Hyperforin</td>
<td>PXR</td>
<td>25</td>
</tr>
<tr>
<td>Artemisia capillaris</td>
<td>Jaundice</td>
<td>Dimethylesculetin</td>
<td>CAR</td>
<td>15</td>
</tr>
<tr>
<td>Soy</td>
<td>Menopause</td>
<td>Genistein</td>
<td>ER, AR, PR</td>
<td>26</td>
</tr>
<tr>
<td>Lactobacillus</td>
<td>Lipid disorders</td>
<td>Isoprenoids</td>
<td>PPARα/γ</td>
<td>27</td>
</tr>
</tbody>
</table>

All examples are from traditional Chinese medicine except Guggul gum (Indian Ayurvedic), Dioscorea villosa (Mexican), and red wine. Note that not all examples could be listed, due to space constraints. Although several illustrative estrogen receptor compounds are shown, there are many environmental estrogens, which are reviewed elsewhere (27). 1Rhubarb. 2One of eight Chinese herbs in the herbal mixture PC-SPES (whose name is derived from PC, prostate cancer, and Latin spes, meaning “hope”): Ipomoea indica; Glycyrrhiza glabra and Glycyrrhiza uralensis (licorice); Panax pseudoginseng (gingseong); Canadeara lucidum; Scutellaria baicalensis (skull cap); Dendranthema morifolium Tavel (chrysanthemum); Rabdosia rubescens; and Senega repens (saw palmetto). 3Yam. 4St. John’s wort. 5Nuclear receptor likely involved in toxicity rather than antidepress. 6Wormwood (component of Yin Zhi Huang and Yin Chin). 7Herb family including basil, rosemary, oregano, and sage. ER, estrogen receptor; AR, androgen receptor; PR, progesterone receptor; VDR, vitamin D receptor; RAR, retinoic acid receptor; FXR, farnesyl X receptor ( bile acid receptor); PXR, pregnane X receptor; CAR, constitutive androstane receptor.