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Antibiotic Delivery Systems for Oral Infections

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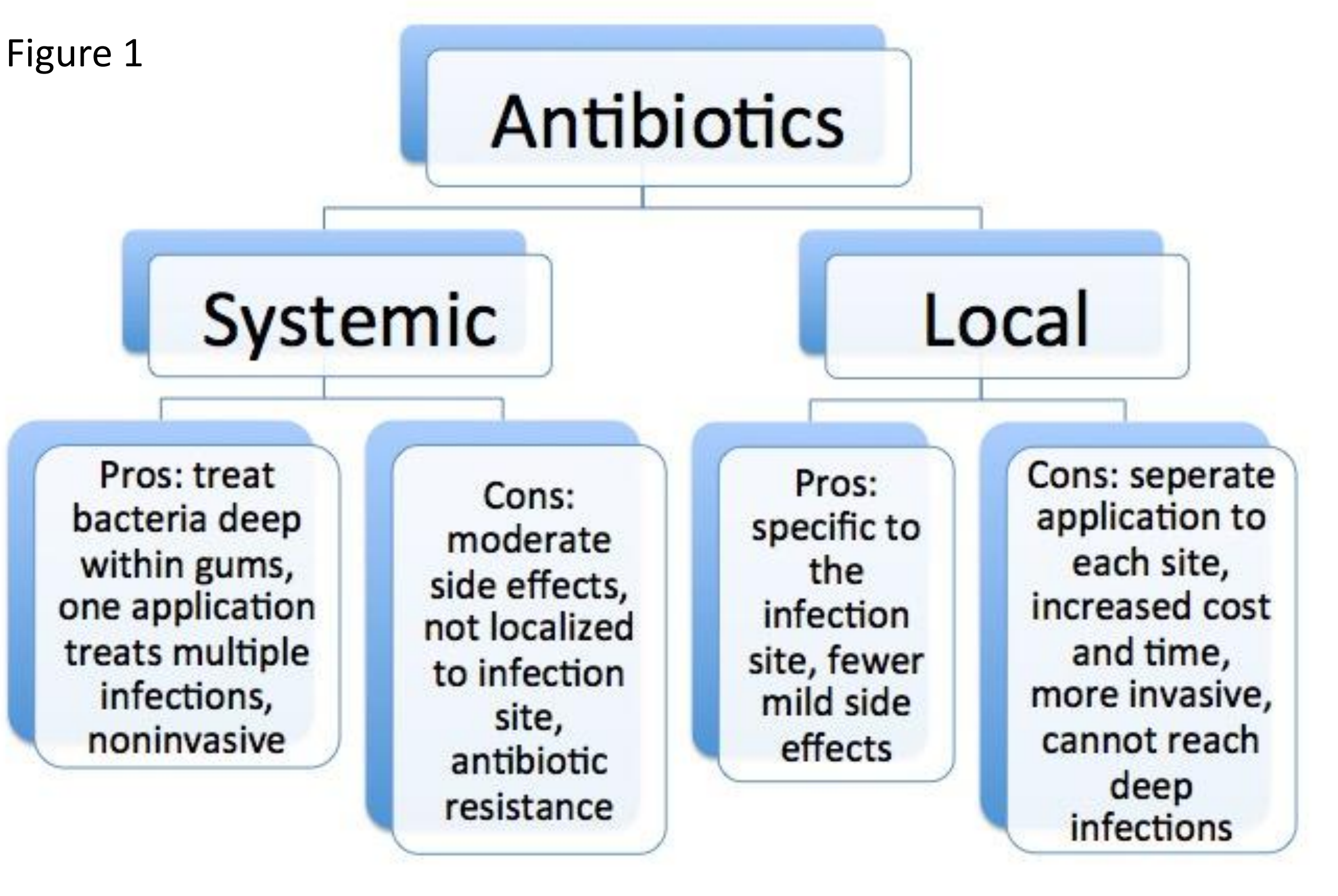
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Abstract

One of the main causes of oral pain is infection in the mouth. The infections can be intraoral or in pockets between the gums and the teeth. Infection in the gum pockets is called periodontitis. Oral infections can cause pain and tooth loss if left untreated and can have other side effects. Systemic or local delivery of the antibiotics can be used for these infections and there are some advantages and disadvantages to each. Studies comparing the types and method of delivery of antibiotics were analyzed. Antibiotic treatment was found to be most effective when combined with scaling and root planing (SRP). However, it was found that current antibiotic treatments only temporarily treat the problem and are not effective at completely eliminating the infections. New delivery systems and technological advancements in medicine need to be developed to effectively and completely treat these infections.

Background

Figure 1



This tooth shows decay (green) and a periapical abscess (blue) where infection has spread through the canals of the tooth.

Figure 2. Attribution: "Decay (green) with apical abscess (blue)" Coronation Dental Specialty Group. <http://coronationdentalspecialty.ca/services/oral-and-maxillofacial-surgery/extractions/>.

Periodontitis – infection within the gum pockets next to the teeth where probing depth is > 4 mm



Figure 3. Attribution: "Gum Disease Treatment" DC Smile Dental Clinic. <http://dcsmiledental.com.au/treatments/gum-disease-treatment/>

Antibiotic Treatment of Periodontitis			
Need	Metric	Local	Systemic
Effectiveness	Pocket Depth Decrease	1.3 mm	1.0 mm
	# Applications	1 per site	1-2 daily
Specificity	Local Delivery	Yes	No
	Hone to Infection Site	No	No
Safety	Severity of Side Effects	Mild	Moderate

Method

To study the effectiveness of antibiotic treatment of oral infections, a literature review was performed. The results from different types and combinations of antibiotics, treatment duration, and combinations with mechanical treatment were all analyzed to discover how well antibiotics treat the infections.

Results

Table 1. Journal of the American Dental Association							
Antibiotic	Number of Statistically Significant(SS) Studies						Average Percent
	Clinical Attachment Level		Probing Pocket Depth		Bleeding on Probing		
	SS	Total	SS	Total	SS	Total	
Amoxicillin and Metronidazole	3	7	5	9	3	9	44
Azithromycin	4	9	5	9	3	9	44
Clarithromycin	0	1	0	1	N/A	N/A	0
Doxycycline	0	2	0	2	0	2	0
Moxifloxacin	1	1	1	1	0	1	67
Metronidazole	2	3	2	3	0	4	44
Ornidazole	1	1	1	1	N/A	N/A	100
Amoxicillin	N/A	N/A	N/A	N/A	0	1	0

Discussion

Current antibiotic treatment - when combined with SRP – only temporarily stop the problem but do not eliminate the root of the infection and therefore are not completely effective.

Conclusion

Current antibiotic delivery systems are inadequate. To effectively and efficiently treat oral infections, a new delivery system needs to be developed.

The new system needs to combine the pros of the systemic and local delivery systems to:

1. Treat bacteria deep in the pockets
2. Eliminate biofilm
3. Localize the antibiotic to the infection site

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