

**Title: Effect of various surface-active-agents on the adhesive-ability of polycarbophil mucoadhesive discs invitro.**

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**Abstract:** Mucoadhesive drug delivery systems could be used for obtaining systemic or local effects of various drugs. The aim of this study was to investigate the effect of the presence of cationic, anionic and nonionic surface-active-agents (surfactants) within or outside discs prepared from polycarbophil, on their strength and duration of mucoadhesion invitro. For this purpose various amounts of the cationic surfactant chlorhexidine, sodium lauryl sulfate (anionic surfactant), Tween 20 and Poloxamer 407 (nonionic surfactants) were used. The effect of the presence of these surfactants within the pH 7.0 phosphate buffer medium, on the strength and duration of mucoadhesion of polycarbophil discs was determined at 37°C, using a model mucosa (rat small intestine). Also effect of the presence of various amounts of surfactants (except Tween 20) within polycarbophil discs, on their strength and duration of mucoadhesion, was assessed. Results showed that the presence of various surfactants outside the polycarbophil discs could reduce the strength and duration of mucoadhesion of discs much more than when they are present within the polymeric discs. This observation depends on the concentration of surfactant, and in the presence of greater amounts of surfactant tends to be greater. Furthermore, it was found that the presence of the cationic surfactant, chlorhexidine, outside polycarbophil discs, produces the greatest reduction in the strength and duration of mucoadhesion of discs. Effect of the other surfactants investigated, on the strength and duration of mucoadhesion of polycarbophil discs was exceedingly less than chlorhexidine. In here, the effect of the anionic surfactant, sodium lauryl sulfate, was somewhat more than the two nonionic surfactants. In addition it was found that the duration of mucoadhesion of polycarbophil discs, especially in the presence of higher amounts of surfactant, is affected more than the strength of mucoadhesion.

In conclusion it seems that the presence of surface-active-agents, and in particular cationic surfactants, could influence the mucoadhesive-ability and hence efficacy of polycarbophil, which is amongst the strongest and most recognised mucoadhesive polymers.

**Keywords:** Mucoadhesion, Strength of mucoadhesion, Duration of mucoadhesion, Polycarbophil, Surface-active-agents, Surfactants.

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( )

Poloxamer Tween 20

pH =

407

)

°C

)

(Tween 20

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( )

( )

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( )

( )

( )

( )

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( )

( )

Lehr

%

( )

Span 60

B.F.

Goodrich

( )

Sigma-Aldrich Chemical

Tobyn

Tween 20

( )

Poloxamer 407 Merck

BASF ChemTrade

Span 60

Triton X 705

Erweka

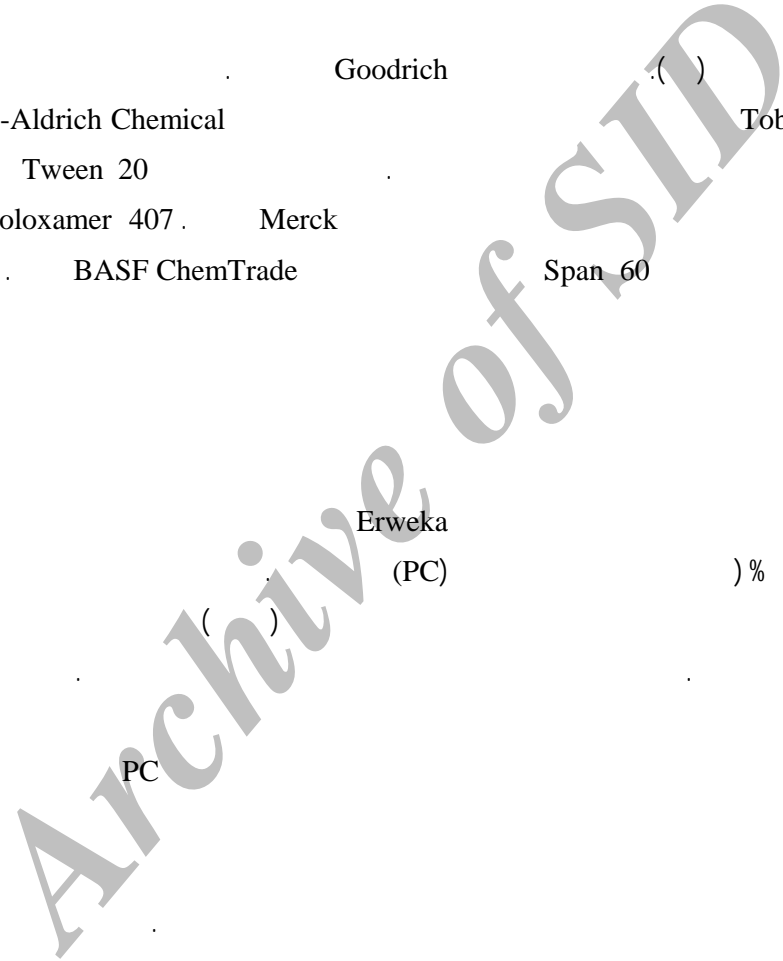
(PC)

)%

( )

(

PC



/ (SLS)

( / )

/ / /

Poloxamer ( / )

/ (POL407) 407

( / )

( )

(rat)

)

N.M.R.I. (

±

)

pH.

pH =

( pH

(

)

/ ± /

( )

C

Tween 20

POL407

( / )

/

( / )

POL407

%

pH =

POL407

%

Tween 20

SLS

( / )

/

/ /

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( )

pH =

pH =

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(

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(

c

(

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PC

C

SLS PC  
 P > / )  
 (ANOVA PC

SLS (pH = )  
 ± ) PC  
 (Tukey post-test ANOVA P < / )

(g) SLS	SLS (g)	(%)	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	

PC  
 PC  
 P > / )  
 (ANOVA

Tween 20

( ) POL407 ( )

P < / )

(Tukey post-test ANOVA

PC

(pH = )  
 PC  
 (n = ± )

(g)	(g)	(%)	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	

Tween 20

(pH = )

PC

(n = ± )

(g) Tween 20	Tween (g) 20	(%)
/ ± /		/
/ ± /		/
/ ± /		/
/ ± /	/ ± /	/
/ ± /		/
/ ± /		/
/ ± /		/
/ ± /		/

SLS

PC

( )

PC

(% ) SLS

(% / )

OL407

PC

Tween 20

POL407

P < / )

PC

(Tukey post-test ANOVA

%

POL407

% /

PC

PC

ANOVA

P < / )

(Tukey post-test

ANOVA

P < / )

( )

(Tukey post-test

POL407

(pH =

)

)

PC

(n= ±

(pH = )

PC

(n= ± )

( )	( )	(%)	
/ ± /	/ ± /	/	
/ ± /	/ ± /	/	
/ ± /	/ ± /	/	

(g) POL407	(g) POL407	(%)	
/ ± /		/	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	
/ ± /		/	
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/ ± /	/ ± /	/	
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/ ± /		/	

( ) SLS

PC

PC

(Tukey post- ANOVA P < / )



%

test

POL407 % / Tween 20

Tween 20

(pH= )

PC

(n= ± )

Tween 20 ( )	Tween 20 ( )	(%)
/ ± /		/
/ ± /		/
/ ± /		/
/ ± /	/ ± /	/
/ ± /		/
/ ± /		/
/ ± /		/
/ ± /		/

PC

% SLS

PC

ANOVA P < / )

(Tukey post-test

SLS

(pH= )

± )

PC

(n=

SLS ( )	SLS ( )	(%)	
/ ± /		/	
/ ± /	± /	/	
/ ± /	/	/	
/ ± /		/	
/ ± /	± /	/	
/ ± /	/	/	

)

(

PC

SLS

POL407

%

PC

ANOVA P < / )

(Tukey post-test

( ) Tween 20

PC

( ) POL407

P < / )

PC

(Tukey post-test ANOVA

POL407

(pH = )

) PC

PC

(n= ±

PC

POL407 ( )	POL407 ( )	(%)	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	
/ ± /		/	
/ ± /		/	
/ ± /		/	
/ ± /		/	
/ ± /	/ ± /	/	
/ ± /		/	
/ ± /		/	

PC

( )

PC

PC

PC

SLS

PC

)

(

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PC

( )

PC

PC

PC

PC

PC

( )

PC

( )

PC

( )

PC

Archive of SID

PC

PC

SLS

PC

SLS

PC

( )

)

PC

(PC

( )

PC

Archive of SID

PC

PC

Tobyn

( )

Span 60

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Triton X 705

%

(% )

POL407

PC

Tobyn

(

)

(

Tobyn

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invitro

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